This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

+ *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.

+ *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.

+ *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.

+ *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at `http://books.google.com/`

R.S.

G.86.L.1

No 59.

Soc. 1996. e. $\frac{68}{28}$

E.B.

Bib. Per. 01

Per. 1891 e. 428/59

THE

RAY SOCIETY.

INSTITUTED MDCCCXLIV.

This volume is issued to the Subscribers to the RAY SOCIETY *for the Year* 1881.

LONDON:

MDCCCLXXXII.

A MONOGRAPH

OF THE

BRITISH

PHYTOPHAGOUS HYMENOPTERA.

(TENTHREDO, SIREX AND CYNIPS, *Linné*.)

VOL. I.

BY

PETER CAMERON.

LONDON:
PRINTED FOR THE RAY SOCIETY.

MDCCCLXXXII.

PRINTED BY J. E. ADLARD, BARTHOLOMEW CLOSE.

PREFACE.

THE present work gives a systematic and biological description of the species of the Hymenopterous Families *Tenthredinidæ*, *Siricidæ*, and *Cynipidæ*, known at present to inhabit Britain. So far as the two first families are concerned, this is not the first work on the British species; for in 1835, in the seventh volume of his 'Illustrations of British Entomology," James Francis Stephens described the species known by him to inhabit these isles. Stephens' work is now obsolete, while since its publication until within the last decade the plant-feeding *Hymenoptera* have been altogether neglected. This is a somewhat curious circumstance, considering that they are the easiest of all *Hymenoptera* to name, that many of them possess elegant and beautiful forms, and many interesting peculiarities of structure, while their life histories can be worked out with comparative ease, and afford biological and physiological problems of the greatest interest for investigation. The *Cynipidæ* or gall-flies have been even more neglected, and only a few fragmentary papers have been published on the British species.

The published works or papers on the British species and the workers at the groups being so few, I cannot hope that the present Monograph is very complete as regards the actual number of British species; while, as will be seen, the life-histories of very many of our commonest species are quite unknown. I cannot hope either that I have escaped the errors of omission and commission incidental to a work of this kind, dealing as it does with little studied and little known animals; but such as it is, I hope, that at any rate it will increase the number of students of these neglected, but most interesting insects, and thus lead to an extension of our knowledge of the British species and their habits.

The literature being thus so scanty, my indebtedness is the greater to those gentlemen who have rendered me assistance by lending me specimens or giving me information. In this respect my thanks are especially due to Professor Westwood, F.L.S., Professor J. W. H. Trail, F.L.S., Professor Gustav L. Mayr, of Vienna, the late Professor Zaddach, of Königsberg, the late Dr. S. C. Snellen van Vollenhoven, of the Hague, Dr. David Sharp, of Thornhill, Dr. Buchanan White, F.L.S., of Perth, Messrs. R. McLachlan, F.R.S., J. E. Fletcher, John B. Bridgman, Joseph Chappell, Edward Saunders, F.L.S., E. A. Fitch, F.L.S., C. W. Dale, James Hardy, J. J. King, Thomas Wilson, T. R. Billups, J. G. Marsh, C. G. Bignall, Richard McKay, the Rev. T. A. Marshall,

E. A. Butler, Herr Brischke, of Dantzig, and the late Fredk. Smith, of the British Museum. To Mr. J. E. Fletcher, of Worcester, I am much obliged for the great trouble he has taken in procuring me larvæ for figuring; Mr. W. F. Kirby, of the British Museum, has given me bibliographical information which I could not obtain here from the absence of libraries; while I have to thank the Secretary of the Ray Society, the Rev. Professor Thomas Wiltshire, F.L.S., Professor Rupert Jones, F.R.S., and Mr. J. J. Weir, F.L.S., for revising the proofs.

GLASGOW;
July, 1882.

A MONOGRAPH

OF THE

BRITISH

PHYTOPHAGOUS HYMENOPTERA.

VOL. I.

INTRODUCTION.

THE term "Phytophagous" is applied to the Insects described in the present work to signify that most of them are plant-feeders, and not that they form a homogeneous section of the Order *Hymenoptera* to which they belong. Nor, indeed, is the term strictly correct, for many of the species in one group—the *Cynipidæ* —are animal parasites; while this family differs structurally from the other families described, in having the abdomen attached to the thorax by a narrow pedicle only—having it appendiculated or petiolate—the abdomen in the other section, that containing the *Tenthredinidæ* and *Siricidæ*, being joined to the thorax by its entire width, or sessile. The latter groups, furthermore, differ from all other *Hymenoptera* (including the *Cynipidæ*) in the peculiar structure of the ovipositor, and in the larvæ having legs on the thorax. The four families of *Tenthredinidæ*, *Siricidæ*, *Cephidæ*, and *Oryssidæ* (*Holonota*, Foerster*) form thus a well-marked section, and together have been variously called *Phytiphaga* in allusion to their habits, *Sessiliventris*, in allusion to the form of the abdomen, and *Securifera* or *Serrifera*, after the form of the ovipositor. We may distinguish the groups as follows:

---

* Ueb. d. syst. Werth d. Flügelgeäders b. d. Hymen., p. 19.

Abdomen joined to the thorax by its entire width. Trochanters with two joints. Anterior wings with a lanceolate cellule. Larvæ with legs on thorax only, or on thorax and abdomen. *Sessiliventris*.*

I. Fourth body-segment (metathorax) fissured in the middle at its apex, antennæ placed above the clypeus, and above the lower part of the eyes. Anterior wings with at least three cubital cellules.

- A. Anterior tibiæ with two spines at the apex. Prothorax small. *Tenthredinidæ*.
- B. Anterior tibiæ with one spine. Prothorax large.
  - 1. Antennæ subclavate, abdomen compressed. Middle lobe of mesonotum not reaching to scutellum. Tibiæ spined. Ovipositor short. *Cephidæ*.
  - 2. Antennæ of uniform thickness. Middle lobe of mesonotum reaching to scutellum, and separated from it by a transverse line. Ovipositor long. *Siricidæ*.

II. Fourth body-segment not fissured. Antennæ inserted below the clypeus and the eyes. Ovipositor semi-spiral. Anterior wings with two cubital cellules. *Oryssidæ*.

1st. *Family*.—TENTHREDINIDÆ.

1. The Imago.

The Head.

The head is always broader than long, but never broader than the thorax; it has never a globular form, and usually is more or less concave behind. The eyes are large, sometimes projecting, and situated on the sides, rarely occupying much of the inner portion of the head. They may (*Sciopteryx*) or may not reach to near the base of the mandibles. The vertex is flat with *Lyda*, depressed with some *Tenthredina*, and thick and somewhat rounded with *Dolerus*, &c.; the three ocelli are placed in a triangle on it. The vertex has sometimes well-marked sutures, as has also the front; while immediately below the ocelli there is sometimes a raised five-angled field—the *pentagonal* or *frontal area*—which is especially well defined with the *Nematina.*

---

* The other division of the *Hymenoptera* is called *Petioliventris*.

There are three of these furrows on the vertex, one on either side of the ocelli, and one between, running in the direction of the central ocellus, but this middle furrow is not always present. Other furrows proceed from below the ocelli, round the base of the antennæ—the *frontal furrows.*

With *Hylotoma, Nematus,* &c., there is a projecting ridge (sometimes with a fovea—the *antennal fovea*—in its centre) between the antennæ—the *antennal tubercle.*

The clypeus is large, and is either deeply incised or truncated at the apex. The labrum is transverse, rounded, and often hairy at the apex. In rare cases the apex of the clypeus is slightly indented as in *Cladius viminalis* (Pl. XV, fig. 3 *b*).

The antennæ.—The antennæ are placed immediately over the clypeus. They are seldom (save in the case of some male insects) much longer than the abdomen, and may be, as in *Perga,* not much longer than the head. With most species they taper slightly in thickness towards the apex, while the joints decrease in length, with those species which have them nine-jointed; the third joint being as a rule the largest. The *Cimbicides* have them clavate or subclavate, the apical joints forming a more or less distinct club. Some species of *Allantus* and *Tenthredo* have them also to a certain extent thickened at the apex, while others have them more or less fusiform. The two basal joints (forming the scape) are more globular than the others, besides being the shortest. The remaining joints may be of equal thickness throughout (as is more often the case) or may be produced beneath into blunt teeth (*Lophyrus*), or projecting processes (*Tarpa*). In *Pinicola* (*Xyela*) the third joint is greatly developed, much thickened, and fusiform in shape. Some species of *Lyda* have the third joint enlarged and thickened, and there may be, between it and the second, a small intermediate joint. A few genera of *Hylotomina* have the large apical joint deeply grooved.

The number of joints varies: *Cimbicides* have from five to seven; *Hylotoma* has only three, namely, two small ones at the base, and a very long terminal one. Nine must be regarded as the normal number, that being the number with *Tenthredina* (with a few exceptions) and *Nematina*. The exceptions are the *Phyllotomides* which have fewer joints (*Cœnoneura* with seven or eight) or more (*Phyllotoma* ten to sixteen joints). *Pinicola* again has twelve-jointed antennæ; *Lophyrus* seventeen to twenty-three; and *Lyda* twenty-two and upwards.*

Male insects have the antennæ often differently shaped from those of the female; being often hairy, pectinated, &c., as explained further on.

The mandibles.—These are as a rule short and thick, broad at the base, and tapering (sometimes bulging out first) to a blunt point at the apex. In *Hylotoma* and some *Nematina* there is only the apical tooth (Pl. X, fig. 10), but other genera have them toothed or indented along the edge as well, and in some cases the basal part has a jagged edge. This is more especially the case with carnivorous species (*Tenthredo*, &c., Pl. XII, figs. 13, 16), while again certain males (*Trichiosoma*) have long, sharply-toothed mandibles, which they use in fighting among themselves.

The form of the *maxilla* (Pl. X, fig. 3) does not offer any striking features, nor does it afford good characters which can be used in classification. The outer lobe (Pl. X, fig. 3, 2) is more or less rounded at the apex, and contracted in the middle, or quadrate at the apex as in *Allantus*. The inner lobe (l. c.,) is very short with *Hylotoma*, with which it scarcely projects beyond the base of the outer; in *Lyda* it is slightly longer; with *Nematus* it ends in a sharp point, which reaches to near the top of the outer lobe; this being the case, too, with *Tenthredo*, only it is longer. Generally the parts are more or less membranous, especially at the apex.

---

* When the number of joints exceeds the normal number (9) they tend to vary in the same species, so that the number of joints cannot always by itself be regarded as a specific character.

The maxillary palpi vary only in the relative size and length of the different joints, and in number (at least, so far as European species are concerned) they are uniform, namely, six. In *Fenusa* there is indeed a short intermediate joint at the apex of the third, according to Hartig, but it is doubtful if it can be regarded as a distinct joint, nor does it exist in all the species. Curtis,* too, mentions a species having only five in the maxillary and three in the labial palpi; but I have not been able to verify this observation, as he does not mention the species, further than saying that it is allied to *Selandria*.

The basal joints are horny; the apical are more membranous and lighter coloured, while they may be provided with short hairs. The basal joint is the smallest, the second somewhat larger, and the third is one of the longest. The fourth, again, is often very small—*Cimbex*, *Cladius*—and not unfrequently the joints, from the second, may be pretty much of the same length—*Dolerus*, *Athalia*, *Tenthredo*.

The *labium* (Pl. X, fig. 2) is deeply cleft into three nearly equal lobes, which are rounded at the apex and generally of the same size and form. The middle lobe, however, may be larger than the others and truncated at the top. *Tenthredo scalaris* has a little conical point on the centre of the middle lobe. Some forms have the parts widely separated and well marked, but with *Hylotoma*, *Tenthredina*, &c., they are closely pressed together.

The labial palpi have usually four joints. With *Cimbex* the third joint is thickened and bulged out, and the fourth knob-like at its outer edge. With other species (*Emphytus*, &c.) the third is smallest, while with *Hylotoma* they increase in size from the base.

---

* B. E., 764.

With *Nematus*, again, there is no great difference in size. *Pinicola* appears to have three-jointed palpi.

Save with *Tarpa* the labium and maxilla are inconspicuous. In *Tarpa* they are long and projecting.

The Thorax.

The thorax forms a compact mass, and is usually slightly broader than the head, and of the same width as the abdomen. The *prothorax* (Pl. X, fig. 1, 17) is small, the only portion visible from above being that part often denominated the "collar," a part which, from its being separated from the lower or leg-bearing portion, has by some been regarded as a distinct piece. The "collar" (pronotum) is firmly united to the mesothorax, from which it is not readily detached. Looked at from the side it is somewhat triangular as it issues from the base of the mesothorax, where the wings are inserted, towards the head, and from that curves down towards the legs; the same being the case on the inner side, so that it becomes quite narrow at its lower part (Pl. XV, fig. 11 *a*). The *episternum* (l. c. *b*) is shorter and stouter than the "collar," and slightly broader at the bottom than at the top. It is much freer in its attachment than the pronotum, and comes away easily, carrying the legs and head with it when pulled from its attachment. The *prosternum* is a small piece situated between the episternum and the two coxæ (Pl. XV, fig. 7, prosternum of *Dolerus*).

The *mesothorax* is very large compared with the two other portions. The scutum and scutellum form one piece, the latter being generally flat and but slightly raised above the scutum, but is usually sharply cut off from the metanotum by the ridge which separates the latter from the mesothorax. The mesonotum is divided by depressions into three parts, a triangular one in front and one on either side, the first being called the "front" or "middle" (Pl. X, fig. 1, 18), and the others the "lateral" lobes of the mesonotum (Pl. X, fig. 1, 19, 20). The middle lobe never reaches to the scutellum, from which it is sometimes separated by a deep depression. Close to the prothorax, and where the wings are inserted, are two overlapping horny points, often differently coloured from the surrounding parts, called *tegulæ.*

The *episternum* is a small three-angled piece situated below the front of the wings. The *mesosternum* and *epimera* are well developed, and their usual form may be seen by a reference to the figures (Pl. XV, fig. 11, *g*, *h*). The *mesophragma* is made visible by removing the metanotum which lies over it. At its base it stretches from one side of the thorax to the other, but it narrows towards its apex, which curves down into a sort of hook form, the apical part being split in two (Pl. XV, fig. 6, *j* from above, *d* from the side).

The *metathorax* forms a narrow ring, and is never larger than the basal segment of the abdomen. It is separated from the mesothorax above by a deep depression. On its front edge, and close to the scutellum, are two white bead-like horny points, called *cenchri* (Pl. X, fig. 1, 22), which are usually unprotected, but with *Lyda* are covered with overlapping hoods. Immediately behind this ring (which has a distinct metasternum) there is, separated from it by a groove, another arc which has no ventral continuation (Pl. XV, figs. 6, 12 *a*, 13 *c*) and bears a stigma (fig. 12 *b*). The precise signification of this segment has been much discussed, some considering it to form part of the abdomen, while others look upon it as belonging to the metathorax. There can be little doubt that it is a distinct segment, and if we regard the thorax as being made up of three segments, then it would have to be regarded as part of the abdomen; but, on the other hand, it seems clear that functionally it forms part of the thorax, it having the muscular system, &c., identical with the three preceding segments, besides being much more intimately bound with the thorax than with the abdomen. In other words, the thorax is to be regarded as composed of four segments,* a view which holds good likewise with the larvæ, whose fourth segment (which is never provided with legs like the succeeding segments) ministers to the thorax rather than to the abdomen, or the part of the body subserving to nutrition. Latreille called it the "segment médiale," a term which is appropriate enough, but probably it is best to call it the fourth thoracic or body segment.

The *legs* have two-jointed trochanters (Pl. X, fig. 8, 1), and have on the apex of the tibiæ (including the front pair, a character which distinguishes them from all other *Hymenoptera*) two spurs (*calcaria*) (Pl. X, fig. 1, 24). The calcaria are absent in the exotic genus *Pachylota.* In length the legs are variable, but they are never of excessive length or thickness, nor is one part ever much developed in proportion to the others. The spurs are sharp-pointed and minutely-toothed with *Dolerus*, *Cladius*, &c.; tubercle-like with *Cimbex* and *Lophyrus;* while with many genera (*Emphytus*, &c.) the point of the outer spine is dilated at the end into a fleshy prong. The posterior calcaria are always simple and sharp-pointed, and one is longer than the other. *Hylotoma, Lyda*, and *Tarpa* (among European genera) bear one or more spines (Pl. X, fig. 1, 25) on the two hind tibiæ, or one on all the legs, as with *Lyda pratensis*, &c. *Hylotoma* has one on each of the two posterior tibiæ, *Tarpa* two on the same parts; some forms of *Lyda* have one on the anterior and three on the two posterior. *Pinicola,* again, has three on each of the two posterior tibiæ. The tarsi are five-jointed. The joints are unarmed with *Phyllotoma*, but, with most of the other genera, they are provided with leaf-like expansions on the underside, called *patellæ* (Pl. X, fig. 6, 1). The claws on the apex of the tibiæ are either equally cleft

---

* See Audouin, Ann. d. Sc. Nat., i, 1824; Latreille, Règne An. v; Westwood, Int. ii, 92; Reinhard, B. E. Z., 1865; Palmen, Zur Morphologie des Tracheensystems, 98.

(bifid) (Pl. XV, fig. 10), simple (l. c. fig. 8), or with a minute tooth not far from the apex (Pl. XV, fig 9).

Crœsus has the basal joint of the tarsus flattened into a plate-like expansion, the posterior tibiæ being also thickened towards the apex. Some species of *Nematus* have the apex of the hinder tibiæ thickened, and often grooved on the inner side.

The *wings* are (with one exception*) always present, and four in number, the two anterior being much the larger pair. They are broadest at the apex, which is rounded (Pl. X, fig. 1 *a*). In texture they are membranous. The front border (the *costa*) is thickened, and towards the apical third of the wing is a thickened spot called the *stigma* (Pl. X, fig. 1 *st*), which is often a conspicuous object, especially when it projects above the costa, as it does with *Pachylostica*.

Generally the wings are hyaline and often iridescent, but with some species they are coloured, either in patches or throughout, the usual colour in either case being black, although with many exotic forms it is bluish; and, in the latter case, it has occasionally a metallic lustre, the wings themselves being of a thicker texture than usual.

Proceeding from the base of the wing towards the apex, but seldom reaching much beyond the stigma, are four nervures, while from the neighbourhood of the base of the stigma, other two nervures run to the apex in a slightly curved fashion. Intersecting these transverse nervures, are shorter longitudinal ones, so that, in this way, enclosed spaces are formed, to which the term *cell* or *cellule* has been applied. As the form and position of these nervures are remarkably constant, and, as the presence of a particular arrangement of the nervures carries along with it peculiarities in other parts of the animal's structure, great attention has been paid to them, especially as to their use in the definition of genera. In this relationship the cells formed by the transverse nervures which run from the base of the stigma to the apex—called the *radial* and *cubital* respectively, and a cell at the bottom of wing—the *lanceolate* cellule, are the most important.

---

* *Pompholyx*, Freymouth, which has the ♀ apterous.

The following are the designations of the various nervures and cellules adopted in this work, with the various names applied to them by different writers on *Tenthredinidæ*,* and a reference to the plate will make their position clear to the student.

Nervures.

1. COSTAL or COSTA (Pl. X, fig. 1 *a*) = *Radius*, Hartig; *Vena marginalis*, Foerster; *Randader* and *Randnerve*, Zaddach.

2. SUBCOSTAL (Pl. X, fig. 1 *b*) = *Cubitus*, Hartig; *Vena submarginalis*, Foerster; *Post-costa* or *Nervus postcostalis*, Thomson; *Unterrandnerve*, Zaddach.

3. MEDIAN (Pl. X, fig. 1 *c*), = *Vena media*, Hartig, Foerster; *Cubitus* or *Nervus cubitalis*, Thomson.

4. ANAL (Pl. X, fig. 1 *d*) = *Vena postica*, Hartig, Foerster; *Nervus branchialis*, Thomson.

5. ACCESSORY (Pl. X, fig. 1 *e*) = *N. humeralis*, Thomson.

6. INFERIOR (Pl. X, fig. 1 *f*).

7. RADIAL (Pl. X, fig. 1 *o*) = *N. marginalis*, Thomson.

8. CUBITAL (Pl. X, fig. 1 *p*) = *N. submarginalis*, Thomson.

10. BASAL (Pl. X, fig. 1*l*) (behind the figure 8 in left wing—letter omitted in right side, see Pl. XV, fig. 1 *b*) = *Margino-discoidalis*, André.

11. 1st TRANSVERSE MEDIAN (Pl. X, fig. 1 *q*, behind figure 12 on left wing, see Pl. XV, fig. 1 *c*) = *N. transversus ordinarius*, Thomson; *Vena transverso-humeralis*, Foerster; *N. medio-discoidalis*, André.

12. 2nd TRANSVERSE MEDIAN (Pl. X, fig 1 *h*) = *N. Trans-*

---

* For fuller details on the wing-characters in the *Hymenoptera* generally see Foerster, Ueber den systematischen Werth des Flügelgeäders bei den Hymenopteren, 1877, and André, Species, i, lxii, *et seq.*

verso-discoidalis, André; *Vena media*, Foerster; = 1st and 2nd inner apical or submarginal nervures of Norton.

13. RECURRENT (Pl. X, fig. 1 *m*, *n*) = *Venæ transverso-discoidales*, Foerster; *Rücklaufendadern*, Hartig.

14. TRANSVERSE RADIAL (Pl. X, fig. 1 *g* dotted line, absent in *Hylotoma*) = marginal nervures.

15. TRANSVERSE CUBITAL (Pl. X, fig. 1 *i*, *j*, *k*) = *submarginal nervures; cubital scheidnerve*, Zaddach.

Cellules.

1. RADIAL (Pl. X, fig. 1) = *marginal*, *cellula marginalis*, Thomson.

2. APPENDICULAR (Pl. X, fig. 2).

3. CUBITAL (Pl. X, fig. 3, 4, 5, 6) = *submarginal*, Thomson.

4. COSTAL (Pl. X, fig. 16) = *Area submarginalis*, Foerster = *branchial*, André.

5. HUMERAL (Pl. X, fig. 7) = *Area humeralis antica*, Foerster; *costal*, André.

6. DISCOIDAL. 1st (Pl. X, fig. 8) = *C. furcata*, Thomson; *Areola discoidalis prima*, Foerster; 2nd (Pl. X, fig. 9) = *Cellula discoidalis*, Thomson; 3rd (Pl. X, fig. 12) = *Areola humeralis media*, Foerster; *C. secunda branchialis*, Thomson.

7. POSTERIOR. 1st (Pl. X, fig. 10) = *Areola discoidalis tertia*, Foerster; *Erste Hinterzelle*, Zaddach. 2nd (Pl. X, fig. 13) = *Aussere Hinterzelle*, Zaddach = apical cells of English authors.

8. MEDIAN (Pl. X, fig. 11) = *Area humeralis media interna*, Foerster.

9. LANCEOLATE (Pl. X, figs. 14 and 15).

14. ANAL. The *anal* cellule, *Areola humeralis postica*, Htg., is situated between the lower edge of the wing and the lanceolate cellule.

The number of radial cells is never more than two, and of the cubital four; but sometimes at the apex of the outer radial cellule there may be a small cellule called the appendicular (*Hylotoma*), but it has never any nervures. When two cells are present, their relative length depends upon the place in which the dividing nervure is received—according as it is received nearer the apex or the base of the cellule. The cubital cells are never less than three with the *Tenthredinidæ*, but may be two only with *Oryssus*. When there are three cubitals, either the first or second may be the longest. The first is small with *Dolerus* and *Cryptocampus*, large with *Emphytus*, *Cladius*. If small, it never receives a recurrent nervure, but in the other case it may receive one only or two. If the first is small the second always receives two nervures. When there are four the first is small and never receives a nervure, but the second and third receive one each, or the second may receive both, *e.g.* *Nematus*.

On the lower side of the wing, between the median and anal cellules, and bounded by the anal nervure above and the accessory beneath, there is an elongated cellule called the lanceolate cellule, which is of great value in classification; and it is moreover peculiar to the *Tenthredinidæ*. According to the position of the accessory in relation to the anal nervure, the cellule assumes four different forms.

I. The accessory nervure issues from the middle of the cellule, where it curves down from it, to unite with it again at the end, thus forming an elongated, sharply-pointed cellule at the end. This is called a *petiolated* lanceolate cellule, and it occurs with the following genera:—*Nematus*, *Dineura*, *Schizocera*, *Fenusa*, *Blennocampa* (Pl. X, fig. 12 *d*).

II. The accessory nervure unites with the anal not far from its origin, then breaks off, but issues again from the anal nervure towards the middle, when it curves down to become united with it at the end. There are thus two unequal cellules formed, a small one at the base and a larger one at the apex. This is a *contracted* lanceolate cellule, and is possessed by *Zaræa*, *Abia*, *Amasis*, *Hylotoma*, *Monoctenus*, *Cladius*, *Camponiscus*, *Hemichroa*, *Hoplocampa*, *Macrophya* (in part), *Synærema* (Pl. X, fig. 12 *e*).

III. The accessory nervure touches slightly the anal in the middle, thus forming two cellules of nearly equal length. To this form the term *subcontracted* has been applied, and we meet with it in *Pachyprotasis*, *Macrophya* in part (Pl. X, fig. 12 *b*).

IV. The nervure does not touch the anal nervure at all; this form may be either open or closed. It may be closed by

(*a*) An oblique cross nervure placed beyond the middle of the cellule as in *Dolerus*, *Emphytus*, *Phyllotoma*, *Eriocampa*, *Athalia*, *Taxonus*, *Poecilosoma*, *Tarpa*, *Lyda*, and *Pinicola* (Pl. X, fig. 12 *a*), or by

(*b*) A straight cross nervure in the centre of the cellule as in *Tenthredo*, *Tenthredopsis*, *Allantus*, *Cimbex*, *Trichiosoma*, *Clavellaria*, *Lophyrus* (Pl. X, fig. 12 *c*).

(*c*) Without any cross nervure, as in *Selandria*, *Strongylogaster* in part, and *Aneugmenus* (Pl. X, fig. 12).

The posterior wings have never a stigma, but may have an appendicular cellule (*Hylotoma*). They are divided into cellules like the anterior, but they are fewer in number and in importance.

The most important feature in classification is the presence or absence of the transverse cubital (Pl. X, fig. 1 *g*, lower wing) and recurrent nervures (fig. *f*). If absent the inner cubital cellule (fig. 5) becomes confluent with the outer (fig. 6), and the discoidal (fig. 8) with the posterior (fig. 9). Generally both nervures are present, but with *Monophadnus*, *Harpiphorus*, *Poecilosoma*, the transverse cubital is absent, and the recurrent present; while with *Emphytus*, *Fenusa*, *Phyllotoma*, *Blennocampa*, *Taxonus*, neither is present. According as these nervures are absent or present, the species are said to have no middle (or discoidal) cellule (as in *Emphytus*), one as in *Poecilosoma*, or two as with *Tenthredo*, &c.

Specific characters, too, are sometimes afforded by the position of the nervures. In this respect the form of the accessory nervure is often useful. Sometimes it is received at a greater or less distance in front of the transverse median nervure (called then appendiculated) (Pl. X, fig. 13), or it may be joined to the transverse median (Pl. X, fig. 13 *a*), when it is said to be interstitial.

The posterior wing has, on the costa, a number of hooks, which fit into the thickened brim of the lower edge of the front wing, so that in this way the two remain united in flight.

It only remains to add that with individual specimens of most species, one or other of the cross nervures may be absent, while, less frequently, greater aberrations are met with. The species of *Dineura* (and the *Nematina* generally) are especially liable to vary in this respect; with *D. stilata*, for instance, the transverse radial nervure is as often absent as present.

In the radial, cubital, and transverse and recurrent nervures, are usually found small, white, blistered spaces, which have been called by Walsh "bullæ." These exist in other groups of *Hymenoptera;* and in the *Ichneumonidæ* have been shown by Walsh* to have, from their constancy in position, some value from a systematic point of view. They do not, however, appear to have an equal value in the *Tenthredinidæ*, although in some cases they would seem to differ in position in closely allied species or genera, and consequently their presence or absence is worth mentioning in specific descriptions, or even in generic ones.

The Abdomen.

The abdomen is joined to the thorax by its entire width. It is, as a rule, longer than the head and

---

* Proc. Ent. Soc. Phil., v, p. 209, and vi, p. 242.

thorax, but may be shorter. It is never quite cylindrical, being usually somewhat flattened above and beneath. With *Selandria* it is ovoid, is longer and more rounded with the *Tenthredina*, and much flattended with *Lyda*. With the *Tenthredina* it bulges out in the middle: *Cimbex* has the dorsal surface somewhat arched, curved down towards the apex, and the belly flattened with the sides sharp. A few forms have the apical segments much contracted. On the apex of the eighth (or ninth, counting the fourth segment as abdominal) segment (which has sometimes no dorsal arc) are two unjointed projecting organs, called *cerci*. They are seldom very conspicuous, but with *Cryptocampus*, &c., they are very prominent. What may be their use is still an unsettled question, but probably they act in some way as tactile organs.

The separation of the abdomen from the above-mentioned fourth thoracic segment is usually marked by a transverse incision, covered with a white membrane, which with *Cimbex* and many other genera is very conspicuous, and is called the *blotch* (*nuditas*). The abdomen thus, according to the above view, consists of eight segments. Of course, if the fourth is to be regarded as abdominal, the number would be nine, and certainly the fourth has every appearance of forming part of the abdomen, if we neglect other considerations.*

While, as has been said, the last segment is not at all, or but slightly, developed above, below it forms two oval or oblong plates, cleft in the middle (Pl. X, fig. 5 1, 3, Pl. X, fig. 4, 8), which are called the *hypopygial valves*. They are seldom of great size, rarely occupying one fourth of the length of the abdomen, except with those species, *e.g. Nematus luteus*, which oviposit in twigs, and consequently require a long and strongly-built ovipositor. In that case it occupies the apical half of the abdomen.

---

* As a matter of convenience, and to facilitate comparison with Continental works, in the descriptions I have counted the number of segments as nine.

The *ovipositor* proper consists of a pair of flattened, broad, lancet-like organs, generally somewhat curved towards the apex, and of a firm horny consistency. Each pair is composed of two distinct parts, viz. a back piece or support (Pl. X, fig. 5 *a*), and the cutting instrument proper. The support is, as a rule, very much stouter in texture than the "saw" itself. It is slightly hollow on one side, while on the lower edge there is a thickened rim, by means of which the "saw" is attached to it. At the base it is much thicker than at the apex, while the colour there is darker. On the surface of the support, as it may be called, are not unfrequently a number of transverse bars, readily noticeable by their deeper colour. With most species these transverse bars are simple, but occasionally they are armed with minute teeth, *e.g. Hylotoma, Nematus luteus.* The support may be (and this is more often the case) of the same shape as the saw, but may be different, as in, *e.g. Cimbex.*

The lower edge of the saw bears projecting teeth, which may be simple projections somewhat like the teeth of a hand saw, or these projections may themselves be armed with minute teeth-like indentations. In *Cimbex* the edge is provided with little bead-like projections, arising at the base from a pedicle, and covered all over with minute teeth. Like the support, the saw bears a number of transverse bars, distinguishable by their darker colour, and either unarmed or minutely toothed (*Cladius*). Thus, the saw (to quote Newport's illustration) is, in its most advanced state, a *lance*, a *saw*, and *file* all in one, for there is no doubt that the teeth on the bars serve as a file. The structure of the saw and its support has a direct relation to the work they have to do. Thus, those species which deposit their eggs in twigs or young branches have the ovipositor very stout, broad, and well armed with teeth, *e.g. Hemichroa rufa*, *Cladius viminalis*, *Hylotoma rosæ*, and *Nematus luteus;* while, contrariwise, when the eggs are laid in the leaves they are slimly built, with the teeth and bars not well developed, *e.g.* *Nematus miliaris*, or may be scarcely represented, as with *Nematus ribesii*, which simply glues the eggs to the leaf without making any cutting.

Outside the saw and its support, and serving as a protecting case to them, is a two-jointed organ, which projects to a certain extent out of the last abdominal segment. The outer joint of this case is, as a rule, differently coloured from the basal portion, is much thinner than it, and hairy at the apex. At the base the inner side is lengthened out, so as to follow the curve of the basal joint, while at the apex it is rounded, but not very sharply (Pl. X, fig. 5).

At first sight the basal joint looks as if it were composed of one piece, but on dissection it is seen to be composed of two. The main piece is longer than broad, and curved to a point at each end, the lower end being the sharpest. At the outer end of the upper part is, firmly attached, a triangular plate, which joins the whole to the base of the eighth abdominal segment (Pl. X, fig. 5, 1), the basal part being thus composed of two pieces.

The saw and the back piece are joined to the above-described plates in the following way:—The support is attached, on the one hand, by its curved base to the middle of the oblong plate on the inner side (fig. 4), while from its thickened rim there proceeds, not far from the base, a thin wire-like structure, which goes round the top of the "oblong" plate, to which it is firmly attached close to the above-mentioned smaller piece (fig. 5, 3). In a similar way a wire-like projection proceeds from the base of the saw, above that of the support, and fixes the saw to the triangular plate, but it is not attached otherwise, save, of course, to the support.

The basal half of the sheath thus not only serves as a point of attachment to the saw, but it may be also said to support its outer valve, which is only loosely attached to it, and consequently is capable of being moved about by the insect with some freedom. It undoubtedly serves as a sheath to protect the apical part of the saw, but I believe it acts also, in some way, as a tactile organ.

The ovipositor, then, is composed of three pairs of organs, or six pieces in all, the two-jointed outer sheath, the support, and the saw itself. The saws are joined near the top, and on the lower side, by a muscular band, but the connection between them is often not very close. They are thus capable of being separated, and form a passage for the eggs to go down. Above the saw may be seen a pair of chitinous processes, between which the tube of the poison gland enters.

The Male Anal Appendages.

The last abdominal segment projects on the lower side and forms a kind of hollow, in which the male genital armature lies. Like the female organs, they are easily extracted, and are of a tough, horny, or leathery texture. At the base is a thin ring (Pl. XV, fig. 14, 3), by means of which the parts are brought into connection with the inner sexual organs. The parts next to this ring are two double-jointed valves, united by membrane at the base. They are curved round on the inner side so as to form a hollow tube, in which the double-valved penis lies (Pl. XV, fig. 14, 2, and fig. 14 *a*), forming, in fact, a sheath for it. The basal part is hard, horny, glabrous, and deep brown in colour. The apical portion is much smaller, more membranous, lighter coloured, and hairy externally (fig. 14, 1); it is usually somewhat triangular or oval in shape, and possesses some flexibility. The shape of the organs may be seen by reference to the figures (Pl. XV, fig. 14).

The male anal appendages undoubtedly might be made to furnish specific characters, but they are very minute, and difficult either to describe or figure, so I have not mentioned them in the descriptions of the species.

The *spiracles* are nine in number. The first is placed on the prothorax, close to its union with the mesothorax, and a little way down from the tegulæ. The second is on the metathorax, close to the mesothorax; the rest are on the first to seventh abdominal segments. They are always placed on the front of the segment, and on the abdomen are situated on the upper edge immediately below the back.

With the larvæ the first segment bears a spiracle; the next is on the footless fourth segment, the rest on segments five to eleven.

The outer covering of the imago is generally smooth and somewhat shining, rarely is it punctured to any extent. A few forms have hairy bodies, *e.g. Trichiosoma.* Many (especially exotic species of the *Hylotomina*) have their bodies of a decided metallic lustre.

As for colour, it is generally black or some shade of it. Some are coppery-green or blue; a few green without any metallic reflection, *e.g. Tenthredo punctulata;* yellow or some shade of it is not uncommon with *Nematina* and *Hylotomina.* The legs are often differently coloured from the rest of the body; red is a not uncommon colour for them, and, as a rule, the tarsi are black, or darker coloured than the other parts. The antennæ may be either uniformly coloured or paler on the under side, more rarely they are ornamented with white rings.

There is one curious point about the coloration pattern in these insects which deserves notice, namely, that many species belonging to widely separated genera are coloured alike. Especially is this the case in the neotropical region, where two forms of coloration, rare in Europe, are very common, there being scarcely a genus without an example of the two patterns. In one case the body and wings are black, or bluish-black, and the prothorax and, it may be, part of the mesonotum, red; in the other the ground colour is yellow with black on part of the thorax, and the wings yellow, with two or more broad black bands. Of the first class we have two or three British examples, of which *Blennocampa eppiphium* is the best known. As the insects having this form are broad compared to their length, and as they have the habit of folding the wings and of pressing the antennæ and legs close to the body, and dropping to the ground, where they remain motionless as if dead, it is possible that the red on thorax may aid in concealing them. The other type of coloration is a common one with terebrant *Hymenoptera* in South and Central America, and I suspect it has some reference to the flower-frequenting habits of the insects.

Secondary Sexual Characters.

Apart from the internal or primary sexual characters, there are more or less well-marked secondary distinctions between the males and females. These differences may be grouped under six heads, it being premised that in all cases the males are smaller, and of a slighter build than the females, while the abdomen is flat, seldom or never cylindrical.

1. *Coloration.*—The general rule is that the males are darker and more obscurely coloured than the opposite sex, while their specific characters are much less well marked. In many luteous species of *Nematus*, for example, the males have the upper surface of the body black; in others, *e.g. Macrophya*, they want the white, yellow, or reddish markings, which the females have on the legs, thorax and abdomen. Many species show no distinction in colour between the sexes, while in others it is extreme. Thus with

Hemichroa alni the ♀ has the head and thorax for the greater part red and the legs black, while the ♂ has the head and thorax black and the legs testaceous. On the other hand, there are species which have the males lighter coloured than the females. This is the case with *Nematus rumicis*, *Heptamelus ochroleucus*, *Tenthredo zonata*, *T. velox*, *&c.*

2. *The eyes.*—The most noteworthy difference in the eyes is with the ♂ of *Abia*, in which they are confluent, or nearly so, at the top of the head, although in the normal position with the ♀.

3. *Mouth organs.*—In *Cimbex*, *Trichiosoma*, and especially *Clavellaria*, the mandibles in the male are very largely developed, projecting, and strongly toothed.

4. *Differences in the structure of the legs.*—In *Trichiosoma* the hind femora are grooved on the lower side, each end of the groove at the apex terminating in a blunt tooth. In *Cimbex* the patellæ are well developed, and at the base of the basal one there is a projecting spine. In the same genus there are blunt, short spines on the coxæ, which are themselves very large, and projecting. Some species of *Allantus* and *Tenthredo* have the legs in the ♂ (especially the hinder pair) much longer than in the ♀, and the tarsi and base of tibiæ thickened, while in *Tenthredo zonata*, besides these differences, the tarsi on the under side, are provided with closely pressed velvety pads of hair.

5. *Antennæ.*—With the majority of saw-flies, the antennæ merely differ in being a little longer or thicker, or in having the joints more compressed. But with the *Lophyrina* they are very dissimilar, being either deeply biramose as in *Lophyrus*, or with only one row of pectinations as in *Monoctenus* and *Cladomacra.* The same is the case in a less degree with *Cladius.* In *Schizocera* and other *Hylotomina*, they are furcate or cleft in two, like the prongs of a fork, the joints being either densely covered with long hair, as in *Sericocera*, or bare and grooved as with *Dielocera.*

Many widely divergent species have them densely pilose, *e.g. Cladius padi, Nematus lucidus, Blennocampa aterrima.* In *Peranthrix* the terminal joint has a stiff bristle. Not a few have the third joint curved in the ♂. The species which have flabellate antennæ in the males, have heavy, thick-bodied females, which, according to my experience, are very sluggish in their habits.

6. *In the wings.*—This is a rare occurrence. The most interesting peculiarity occurs with *Perineura, Synaerema, Blennocampa* with a few species, *Eriocampa Cinxia,* and *Taxonus agrorum,* in which the apical cross nervures are situated at the apex of the wing, so as to form a continuous border round it, while with the females they are in the normal position, *i.e.* in the middle. The median cellules, therefore, do not exist, properly speaking (Pl. VIII, fig. 10, Pl. XI, fig. 6 *a*).

Habits of the Perfect Insects.

In the perfect state saw-flies live but a very short time—generally only a few days. They abound mostly during the months of May, June, and the early part of July, and with the second broods at the end of July and in August. As a rule they are very sluggish in their habits. Their flight is weak and heavy, and they never fly far at a stretch; usually they alight after a flight of ten to twelve feet, and unless engaged in laying their eggs it is only in the sunshine that they fly much, nor do they rest long on any particular spot when the weather is warm. During dull weather, and after the sun has set, they rest almost motionless on the leaves of plants, &c. The species of *Lyda* are very active during hot sunny days. Many species frequent flowers, partly for the purpose of feeding on the pollen, but also, in the case of *Tenthredo* and *Allantus,* in order to prey upon *Meligethes, Byturus,* and other insects found in such situations. The plants which they are most partial to are *Ranunculaceæ*, *Umbelliferæ*, *Rosaceæ*, and *Compositæ*. The flower-visiting species belong mostly to *Tenthredo* and *Allantus;* next in order we have *Hylotoma*, *Cephus*, *Athalia*, *Dolerus*, and last of all *Nematus*, which are very seldom found on flowers. *Selandria serva* is often seen on *Umbelliferæ; Tarpa* on *Compositæ; Abia* on *Umbelliferæ* and *Compositæ; Tenthredo livida* I have noticed to have a partiality for *Rubus idæus;* various species of *Dolerus* (which are the earliest in the season to appear) are not uncommonly observed on willow catkins. I have a specimen of *Athalia hæmatopus* (a South-African species) with pollinia of an orchid attached to the fore tarsi.

Many of the smaller species—especially those of *Blennocampa*, *Fenusa*, and some of the smaller species of *Nematus*, have a habit, when alarmed in any way, of tucking the antennæ, legs, and wings, close to the body, and falling to the ground as if dead; and often they remain some minutes in this position before making an attempt to escape. This seems to be the only peculiar method they have of escaping from their enemies, except the usual ones of flight, &c., and, in the case of *Trichiosoma* and other larger forms, of using the mandibles on whatever attacks them.

Beyond depositing the eggs in the proper nidus, the females, in the great majority of species, take no further care of their progeny, and generally die immediately after oviposition. An interesting exception to this is found in the case of a Tasmanian species of *Perga* (*P. Lewisii*, W.), which deposits its eggs in a longitudinal incision between the two surfaces of the leaves of an *Eucalyptus*, close to the midrib, arranged across in a double row, there being about eighty eggs in all. The mother sits over them with outstretched legs, and when the larvæ make their appearance she follows them, defending them with great assiduity from the attacks of Ichneumons and other enemies.

I am not aware of any internal parasites attacking them in the perfect state except fungi. Nor do they seem to have any special external enemies. Birds I have never seen feeding on them, but have often witnessed combats between them and ants, carnivorous beetles, and centipedes.

The males appear five or six days in advance of the females. The union of the sexes generally takes place in the sunshine. It lasts only for a few minutes, after which the female gets restive and kicks off the male, who dies in a few hours after, while the female immediately proceeds to deposit her eggs. From the structure of the copulatory organs, the ♂ has to insert them backwards; and sometimes one may be seen dragged about by the ♀, attached only by the anal appendages.

So far as my observations go no selection is shown by either sex in choosing partners. With *Trichiosoma* I have noticed that the males, after emerging, and apparently before the females have appeared, assemble together on the tops of birches (with *T. lucorum*), round which they fly in circles in the hot sunshine, making as they do so a loud buzzing noise, not unlike the humming of a *Bombus*. They do not fly far, and generally return after a short flight to the tree top from which they started. I was once the witness of a battle between two males of *T. lucorum*, which lasted for nearly ten minutes, or perhaps longer, for they flew away, and may have continued the fight after I lost sight of them. Their mode of fighting was simply to fly at each other in the air, a concussion of the two bodies being the result; and they must have come together with some force for the noise made thereby could be distinctly heard. I did not observe whether they tried to use their mandibles or not, but Westwood mentions (Intr. ii, 109) having caught two males with their mandibles interlocked. And every collector knows that these insects can use their mandibles to some purpose.

Parthenogenesis.

With regard to the relative number of the two sexes, it is only with a few species that the males and females can be said to be in anything like equal numbers. As a rule the males are far fewer than the females, and this remark holds good not only with captured specimens, but also with those bred. Not only are the males fewer, but with some species they are absolutely unknown, while with several species which have males in tolerable numbers parthenogenesis plays a normal or occasional rôle.

Of common species provided with males, but in extremely limited numbers compared with the females, may be mentioned *Strongylogaster cingulatus*, *Selandria stramineipes*, *Hemichroa alni*, *Crœsus varus*, *Blennocampa ephippium*, *Eriocampa adumbrata*, *Nematus quercûs*, *N. gallicola*, *N. acuminatus*. Of *Stron. cingulatus*, Mr. Frederick Smith wrote me that he had only taken in all five or six males, and these not on the ferns, but on *Umbelliferæ* in company of the females; while often he had had forty or fifty females in his net at one time without a single male. My own experience with this species is exactly the same. The only male I have taken of *S. cingulatus* was bred, and curiously enough it appeared a fortnight after the females. I have often reared *N. gallicola*, but have never been able to procure a male; Mr. Smith has been more fortunate, although even with him there only occurred "a single male out of several hundreds of the flies" (Proc. Ent. Soc. Lond., pt. iii, 1876, p. 22). *Crœsus varus* is only known to have a male from the very doubtful account of its original describer Villaret, and that of *Blennocampa ephippium* from a single specimen taken by Brischke (Beitr. zur Parth. d. Arth., p. 228). The male of *Eriocampa adumbrata* is very scarce, and I have only seen one myself. As an example of a species where the males may be said to be tolerably common may be mentioned *Nematus fallax*, yet on counting the specimens which I have caught and bred, I find a proportion of about one male to twenty females.

The number of species in which no males are known is pretty considerable, yet as many of these are rare and local, it cannot be said with certainty that they do not exist. Yet with some common species there is evidence tending to show that this is actually the case, or if they do appear it is at rare intervals. For instance, Mr. Smith bred one year about four hundred females of *Eriocampa ovata*, while not one of the other sex made its appearance. This is also my own experience; nor has any Continental author described it. Again, I have frequently bred such abundant species as *Hemichroa rufa*, *Phyllotoma nemorata*, *Poecilosoma pulveratum*, *Fenusa betulæ*, without males coming forth, and this has been the case with many other observers.

Dineura verna is a widely known and common species, of which no males have been discovered; the same may be said of *Poecilosoma luteolum*,* *Hoplocampa brevis*, *Blennocampa brevis*, *B. luteiventris* (?), *B. albipes*, *Nematus Erichsoni*, and *N. pallidiventris*. The lack, or at least extreme scarcity, of males in these insects may be accepted with tolerable certainty, since, if they existed at all they would, ere this, have been bred. And, as every breeder of insects knows, males are easier to rear than females, from their smaller size and from their appearing earlier.

But the evidence of the occurrence of parthenogenesis with the *Tenthredinidæ* is not altogether of this negative nature. From the admirable and thorough observations and experiments of Kessler (Die Lebensgeschichte von Ceuthorhynchus sulcicollis und Nematus ventricosus, Cassel, 1866), and more especially of von Siebold (Beitr. zur. Parth. d. Arth., pp. 107—130), there cannot be the slightest doubt that *Nematus ribesii* possesses the faculty of laying unfertilised eggs which invariably yield only males. There is reason to believe that they do this regularly should they be prevented, from any cause whatever, from having access to the males; and the eggs are laid immediately after the females have left the cocoons. And when these unfertilised females are examined after oviposition, no traces of spermatozoa can be discovered in the ovaries, while they are easily observed in those which have been fertilised. It is worthy of remark that this peculiarity of *ribesii* was noticed by Robert Thorn as early as the year 1820 (in the 'Memoirs of the Caledonian Horticultural Society,' iv, pt. 2). He seems to have had an idea "that there is a connection between ♂ and ♀ caterpillars; for I have frequently observed them twisted together for some time after they had ceased eating, and a little before they cast their skins to go into the pupa state."

---

* André has recently signalised a male of this species from Syria, the only record I have of its existence (Ann. Soc. Ent. Tr., 1881, 353).

My own experiments with *N. ribesii* are completely in accord with those of the writers just mentioned; while with *N. miliaris,** *N. glutinosæ*, *N. curtispina*, and *N. palliatus*, I have likewise been successful in getting unimpregnated females to oviposit, the result being (when the larvæ did not perish young or in the cocoons) that only males were produced. Mr. J. E. Fletcher has likewise successfully experimented with the species just named, with the same result, save that in one experiment with *N. curtispina* he reared 21 ♂ ♂ and 1 ♀. The rearing of a ♀ from an unimpregnated ♀ is certainly very rare, and contrary to the results obtained with other species and by myself with the same species, yet from the care with which Mr. Fletcher conducted his investigation there can be no doubt of the correctness of his statement.†

The same gentleman got an unimpregnated ♀ of *Nematus gallicola*‡ to lay eggs, but owing to the weakness of the plant (a potted one) did not rear the larvæ; a virgin *Phyllotoma vagans* to deposit between sixty and seventy eggs, but failed to rear anything from them; one of *Eriocampa ovata* about thirty ova; and also got *Hemichroa rufa* to lay, rearing males only from the former, and males and females from the latter.*

---

* Scot. Nat., iv, 157; Trans. Ent. Soc., 1880, 77.

† Ent. M. M., 1880, p. 269.

‡ Trans. Ent. Soc., 1880, 77.

Mr. Fletcher also bred two females from virgin ova laid by two *Crœsus varus*.† Mr. Bridgman has also got eggs from a virgin ♀ of *E. ovata*.‡

I have myself obtained larvæ from virgin *Strongylogaster cingulatus*, *Phyllotoma nemorata*, *Hemichroa rufa*, *Poecilosoma pulveratum*, and reared females from the two last species.

From these observations it is perfectly clear that complete parthenogenesis occurs in such species as *Eriocampa ovata*, *Poecilosoma pulveratum*, and *Crœsus varus*, while the mixed parthenogenesis of *Nematus ribesii* and *N. miliaris* is beyond dispute. From the readiness with which so many species deposit ova without having had any connection with the males, and from the general scarcity of the latter, it seems evident that further investigation will show that the phenomenon is of very common occurrence.

Von Siebold in his book has analysed Hartig's *Blattwespen* with reference to this question, and shows that the German author was unacquainted with the males of 76 species out of a total of 381. A similar analysis of the British species shows that the males of 53 species are yet unknown. No doubt many of these are rare and little known forms, so that no great reliance can be placed on them alone as showing the scarcity or absence of males, yet the same result is brought out in another way. Tabulating the species in my collection I find, that in addition to the maleless species noted above, 54 species are represented by females only, so that I have never seen the males of something like a third of the British species.

As to the precise significance which the phenomenon may play in the economy of the creatures, it is idle to speculate with the scanty knowledge at our command. It is obvious, for one thing, that a greater number of larvæ will be produced with complete parthenogenesis than with the mixed, or even with sexual generation; for every individual that comes to maturity is capable of producing offspring, while with the sexual brood, possibly half of the brood might be males. A considerable number of the males born from the parthenogenetic larvæ again may never (and I believe this to be the case) come near the females, and thus are useless, so far as the perpetuation of the species is concerned. Thus it looks as if complete parthenogenesis was more favorable to the continuation of the species than mixed; and it is clear, from the graduated series of cases we have, from the sexual state through mixed to complete parthenogenesis, as well as from other considerations, that the faculty of dispensing wholly or in part with the males has been acquired. That it is not injurious to the species may be concluded; but I am inclined to believe that, compared with sexual broods, fewer imagos are produced from parthenogenetic larvæ; and if that conclusion is correct (and it is founded on many observations made on *Poecilosoma pulveratum* and *Nematus gallicola*) it follows that the species are enabled to flourish only through the great number of eggs which are deposited, that is to say, they have less vitality for resisting climatal agencies, or insect or fungoid enemies. My observations, however, are not sufficiently complete to enable me to say definitely that such is the case, but the subject is one well worthy of the attention of entomologists.

---

* E. M. M., xviii, 126. † E. M. M., xvii, 180. ‡ Ent., 1878, 191.

Our present knowledge of parthenogenesis with the saw-flies may be tabulated as follows:

1. Eggs laid by virgin females yielded males with *Nematus ribesii*, *N. pavidus*, *N. curtispina*, *N. miliaris*, *N. glutinosæ*, *N. palliatus*, *N. salicis*.
2. Eggs laid by virgin females yielded males and females with *Nematus curtispina*, *Hemichroa rufa*.

3. Eggs laid by virgin females yielded females only with *Hemichroa rufa, Eriocampa ovata, Poecilosoma pulveratum*, and *Crœsus varus.*

4. Eggs were laid by virgin females of *Phyllotoma nemorata, Ph. vagans, Taxonus glabratus, Strongylogaster cingulatus, Nematus salicivorus*, but no insects were bred from them.

2. The Transformations.

The Egg.

The egg is ovoid and longer than broad, with sometimes a curve on one side. The colour is white, occasionally with a bluish tinge or slightly greenish. The usual nidus for the egg is the leaf, but the manner in which the eggs are deposited on it is very varied. Very often they are scattered irregularly over the epidermis (*Nematus miliaris*), or they may be placed along the edge, the projecting part of the leaf being used for this end by *Hemichroa alni;* and again, they may be arranged along one or other of the veins as with *Nematus ribesii.* Some species sink the eggs in a hole in the epidermis, while others merely glue them to it. A few species place them in a clump (*N. pavidus*), but mostly they are separated from each other when several are laid on the same leaf. One or two of the leaf miners deposit only one egg on a leaf. Many widely divergent species place their eggs in the petiole, in which they may be either arranged in a single or double row. And in connection with this, it is worthy of being noted that the species having this habit have the ovipositor very strong and broad, *e.g. Hylotoma pagana, Hemichroa rufa, Nematus luteus.* Most of the gall-making species lay their eggs in the leaf-buds before they have expanded, and in some instances the growth of the gall and of the leaf goes on at the same time.

After the egg has been in the plant a few hours, it swells up to more than double the size it was when laid, while at the same time the receptacle in which it was deposited has widened, and, it may be, blackened. Thus, instead of being beneath the epidermis (or twig as the case may be), it now projects out of it. The cause of this swelling is obscure. It is certain that when the egg was laid, a drop (Westwood* calls it a "drop of frothy matter") of liquid was laid in the incision along with it, but I do not think that this has anything to do with the swelling of the egg. Its purpose seems rather to be to widen and keep open the incision made for the reception of the ovum, so that its sides may not crush it; and probably, too, it in some way causes moisture to flow to the incision from the surrounding portions. According to Newport,† on the second day after the egg was laid the incision expanded so much that "a free space remained around the egg equal to its own width on each side." Westwood‡ further remarks that the eggs imbibe "nutriment in some unknown manner through their membranous skins from the vegetable juices which surround them."

The swelling takes place before the form of the larva can be seen in the egg, which can usually be done on the third day. Whether the development of the larva is ever retarded for a much longer period is a point about which I have no definite information.

I think, however, it is very probable that with *Emphytus serotinus* (which appears in the perfect state at the end of September and October) the eggs remain unaltered during the winter. We must either assume that, or that the larvæ appear when the leaves are about gone, that they hibernate in a very young state while the winter lasts, and then come out with the young leaves in the spring.

---

* Intr., ii, 95.

† Prize Essay, p. 23.

‡ L. c., p. 96.

Habits of the Larvæ.

The larvæ feed on almost all classes of phænerogamic plants, but having a decided preference (so far at least as our present knowledge goes) for trees such as *Betula, Salix, Populus, Alnus*, and *Pinus*. To these plants they not unfrequently do great damage. Osiers suffer severely from the attacks of species of *Nematus* on the leaves; *Salix pentandra* I have seen killed by the *Cryptocampus pentandræ; Nematus pavidus* is injurious to some of the small willows; and *N. miliaris* too often strips the leaves of *S. pentandra*. Various species of *Lophyrus* have, on different occasions, devastated the pine forests along with the pine-feeding *Lydæ*. Our cultivated plants have not escaped from their ravages, as the attacks of *Athalia spinarum* on the turnip, *Nematus ribesii* on the gooseberry, and *Eriocampa adumbrata* on pear and plum trees, too often bear testimony.

I have drawn up a list of the food-plants so far as they are known to me. I have thought it as well to include species not yet known to inhabit Britain, so as to serve as a guide to the student by showing him what he may expect to find on the various plants. The great majority of the species, it may be added, confine themselves to the same food-plant; some, however, feed indifferently on plants belonging to the same natural order, while one or two species attack plants of diverse orders.

LIST of FOOD-PLANTS.

Celmatis Vitalba. Blennocampa croceiventris, *Kl.*
Clematis erecta. ? Athalia abdominalis, *F.* (see *postea*).
Ranunculus bulbosus. Amasis laeta, *F.*
Ranunculus Ficaria. ? Blen. albipes, *Schr.*
Ranunculus acris. Nematus Fahrei, *Dbm.*

Ranunculus repens.
Dineura despecta, *Kl.*
Blennocampa albipes, *Schr.*
Aquilegia vulgaris. Nematus aquilegiæ, *Voll.*
Berberis vulgaris. Hylotoma berberidis, *Schr.*
Sinapis arvensis. Athalia spinarum, *F.* A. ancilla, *Lep.*
S. nigra and *S. alba.* Allantus flavipes, *Fourc.*
Brassica campestris, var. Napus and Rapa. Athalia spinarum, *F.* A. ancilla, *Lep.*
Sisymbrium officinale. A. ancilla, *Lep.*
Raphanus sativus. A. spinarum, *F.*
Cardamine pratensis. Tenthredo sp.*
Hypericum perforatum. Tenthredo sp.
Viola palustris. Tenthredo sp. (probably Blennocampa).
Tilia parvifolia and *Europæa.*
Eriocampa annulipes, *Kl.*
Blennocampa Tilliæ, *Kalt.* (mining the leaves).
Geranium robertianum. Emphytus carpini, *H.*
Impatiens Noli-me-tangere. Macrophya sturmi, *Kl.*
Acer pseudo-platanus and *campestre.* Phyllotoma aceris, *Kalt.*
Sarothamnus scoparius. Tenthredo sp. (a species very like a *Taxonus* larva).
Trifolium pratense and *repens.*
Nematus myositidis, *F.*
Tenthredo sp. (a true Tenthredo apparently).
Lotus corniculatus. Tenthredo sp.
Robinia Pseudo-acacia. Nematus tibialis, *Newm.*
Prunus communis, domestica, &c.
Eriocampa adumbrata, *Kl.*
Cladius padi, *L.*
Nematus moestus, *Zad.*
Lyda nemoralis, *F.*
L. pyri, *Schr.*
Phyllœcus compressus, *Fab.*

---

* In this list, when no particular species is mentioned, the name "*Tenthredo*" is used in a wide sense to include any unknown larva belonging to the *Tenthredinides* which could not be referred to its proper genus.

Cratægus Oxyacantha.
Cladius padi, *L.*
Dineura stilata, *Kl.*
Nematus xanthopus, *Zad.*
E. adumbrata, *Kl.*
Tenthredo sp.
Cimbex humeralis, *Fourc.*
Trichiosoma betuleti, *Kl.*
Lyda punctata, *F.*
Pyrus communis, Aucuparia, &c.
Eriocampa adumbrata, *Kl.*
Hoplocampa testudinea, *Kl.*
Nematus abbreviatus, *H.*
N. posticus, *Foer.*
Crœsus septentrionalis, *L.*
Dineura testaceipes, *Kl.* D. stylata, *Kl.*
Lyda pyri, *Schr.* Lyda nemoralis, *L.*
Trichiosoma sorbi, *H.*
Rubus Idæus, fruticosus, &c.
Hylotoma enodis, *L.* H. cyanella, *Kl.*
Cladius brullæi, *Dbm.* C. padi, *L.*
Tenthredo sp.
Emphytus perla, *Kl.*
Fenusa pumilio, *Kl.*
Blennocampa geniculata, *H.*
Phyllœcus fumipennis, *Evers.*
Cotoneaster vulgaris. Lyda pyri, *Schr.*
Comarum palustre. Tenthredo, sp.
Rosa canina, eglanteria, &c.
Eriocampa adumbrata, *Kl.* E. caninæ, *Cam.*
Hoplocampa brevis, *Kl.*
Blennocampa pusilla, *Kl.*
Emphytus cinctus, *L.* E. rufocinctus, *Retz.* E. melanarius, *Kl.* E. togatus, *F.* E. didymus, *Kl.* E. viennensis, *Schr.*
Poecilosoma candidatum, *Fall.*
Cladius difformis, *L.* C. padi, *L.*
Hylotoma rosarum, *F.* H. pagana, *Pz.* H. enodis, *L.* H. cyanella, *Kl.*, and Amethistina, *Kl.*

Rosa canina, eglanteria, &c. (continued).
  Lyda inanita, *Vill.*
  Phyllœcus phtisicus, *Fab.*
Agrimonia Eupatoria. Fenella nigrita, *West.* (leaf miner).
Potentilla reptans. Fenella nigrita, *West.*
Fragaria vesca. Tenthredo sp.
Geum urbarum.
  Blennocampa geniculata, *H.*
  Fenella nigrita, *W.*
  Fenusa pumilio, *Kl.*
Spiræa Ulmaria.
  Emphytus calceatus, *Kl.*
  Poecilosoma excisum, *Th.* (?).
  Blennocampa geniculata, *H.*
  Cephus zanthostoma, *Evers.*
Alchemilla vulgaris.
  Blennocampa alchemillæ, *Cam.*
  Tenthredo sp.
Ribes grossularia and *rubrum.*
  Hylotoma-rosæ ?.
  Nematus ribesii, *Scop.* N. consobrinus, *Voll.* N. appendiculatus, *H.*
  Emphytus grossulariæ, *Kl.*
  Selandria morio, *F.* (?) (see *postea*).
Ægopodium Podagaria. Tenthredo flavicornis, *F.*
Bupleurum falcatum. ? Allantus flavipes, *Fourc.*
Laserpitium latifolium, Lin. Tarpa spissicornis, *Kl.*
Heracleum Sphondylium.
  Tenthredo mesomela, *L.*
  Allantus heraclei, *Rudow.*
Anthriscus sylvestris. ? Cladius eradiatus, *H.*
Pastinaca sativa. Athalia Græslii, *Dours.*
Sambucus nigra and *racemosa.* Macrophya albicincta, *Sch.* ? M. ribis, *Schr.*
Viburnum Opulus. Allantus 3-cinctus, *F.*
Lonicera Xylosteum, L. Caprifolium.
  Hoplocampa xylostei, *Gir.* (galls on twigs).
  Tenthredo livida, *L.*

Lonicera Xylosteum, *L. Caprifolium* (continued).
Allantus 3-cinctus.
Cimbex lutea, *L.*
Abia ænea, *Kl.* A. fasciata, *L.* (also on *Lonicera tatarica*).
Symphoricarpus racemosus.
Allantus 3-cinctus.
Tenthredo livida, *L.*
Abia ænea, *Kl.*
Valeriana officinalis. Tenthredo sp.
Scabiosa succisa.
Abia sericea, *L.*
Tenthredo dispar, *Kl.*
Petasites vulgaris. Tenthredo sp.
Solidago Virgaurea. Tenthredo sp.
Achillea millefolium. Allantus sp.
Senecio nemorensis. Tenthredo sp.
Cirsium lanceolatum. Emphytus tener, *Fall.*
Vaccinium Vitis-idæa. Nematus vacciniellus, *C.*
Vaccinium Myrtillus. Nematus quercus, *H.* Nematus sp. (a green larva).
Lysimachia vulgaris. Poecilosoma luteolum, *Kl.*
Fraxinus excelsior.
Allantus 3-cinctus, *F.*
Pachyprotasis simulans, *Kl.*
Tenthredo punctulata, *Kl.*
Macrophya punctum album, *L.*
Blennocampa nigrita, *F.* B. sericans, *H.* *B.* melanopygia, *Costa.*
Ligustrum vulgare. Macrophya punctum, *L.*
Syringa vulgaris. Allantus 3-cinctus, *F.*
Jasminum. Allantus 3-cinctus, *F.*
Verbascum nigrum. } Allantus scrophulariæ, *L.*
Scrophularia nodosa. }
S. aquatica. Pachyprotasis rapæ, *L.*
Veronica Beccabunga, *officinalis*, *Chamædrys.*
Tenthredo mesomela, *L.*
(?) Taxonus equiseti, *Fall.* Athalia annulata, *F.*
Nepeta Glechoma. Taxonus sp.

Stachys erecta. Nematus fuscus, *Lep.*
Plantago major, media, &c. Taxonus sp.
Polygonum Bistorta, aviculare, &c.
  Tenthredo sp.
  Taxonus glabratus, *Fall.*
Rumex Acetosella, acutus.
  Tenthredo sp.
  Nematus rumicis, *Fall.*
  Taxonus equiseti, *Fall.*
Euphorbia palustris. Tenthredo sp.
Urtica dioica. Tenthredo sp.
Ulmus campestris and *montana.*
  Cladius rufipes, *Lep.*
  Nematus melanocephalus, *H.*
  Fenusa ulmi, *Sund.*
Populus nigra, dilatata, tremula.
  Cladius viminalis, *Fall.*
  Crœsus septentrionalis, *L.*
  Nematus melanocephalus, *H.* N. albipennis, *Hg.* N. croceus, *Fall.* N. conjugatus, *Dbm.* N. Zetterstedti, *Dbm.* N. pavidus, *L.* N. compressicornis, *F.* N. cœruleocarpus, *H.* N. aurantiacus, *Htg., Voll.* N. umbripennis, *Evers.* N. pallicercus, *Voll.* (Validicornis, Foer.). N. sulphureus, *Zad.* N. curtispina, *Th.*
  Cryptocampus inquilinus, C. populi (pentandræ), *Htg.*
  Phyllotoma ochropoda, *Kl.*
  Fenusa hortulana, *Kl.*
  Cimbex Amerinæ. *L.*
  Lyda sylvatica, L.
  Xiphydria dromedarius, *F.*
  Sirex fuscicornis, *F.*
Salix caprea, fragilis, vitellina, &c.
  Tenthredo punctulata, *Kl.*
  Emphytus succinctus, *Kl.* (?).
  Phyllotoma microcephala, *Kl.*
  Nematus pavidus, *Lep.* N. fulvus, *H.* N. salicis, *L.* N. melanocephalus, *H.* N. cœruleocarpus,

Salix, caprea, fragilis, vitellina, &c. (continued).

H. N. histrio, *Lep.* N. fallax, *Lep.* N. Glenelgensis, *Cam.* N. validicornis, *Foer.* N. cadderensis, *Cam.* N. glottianus *Cam.*

N. conjugatus, *Dbm.* N. melanoleucus, *Htg.* N. pallescens, *H.* N. miliaris, *Pz.* N. palliatus, *Th.* N. lacteus, *Th.* N. xanthogaster, *Foer.* N. sulphureus, *Z.* N. jugicola, *Thoms.* N. leucostictus, *H.* (N. crassulus, *Thoms.*) N. gallicola, *Ste.* N. ischnocerus, *Th.* N. herbaceæ, *C.* N. viminalis, *L.* N. vesicator, *Br.* N. baccarum, *Cam.* N. bellus, *Zad.* N. fulvipes, *Fall.* N. fraxini, *H.* N. salicivorus, *Cam.* N. curtispina, *Thoms.* N. bergmanni, *Dbm.*

Crœsus septentrionalis, *L.*

Cryptocampus angustus, *H.* C. pentandræ, *L.* C. saliceti, *Fall.*

Cladius æneus, *Zad.*

Cimbex vitellinæ, *L.* C. femorata, *L.* C. amerinæ, *L.*

Zaræa fasciata, *L.* (?)

Hylotoma enodis, *L.*, nec *Kl.* H. ustulata, *L.* H. fuscipes, *Fall.* H. melanochroa, *Gmel.* H. atrata, *Fors.* H. ciliaris, *L.*

Lyda sylvatica, *L.*

Xiphydria dromedarius, *L.*

Betula alba.

Emphytus succinctus, *Kl.* (?). E. cingullum, *Kl.*

Dineura degeeri, *Kl.* D. rufa, *Pz.*

Fenusa betulæ, *Z.* F. pumila, *Kl.*

Crœsus septentrionalis, *L.* C. latipes, *Vill.*

Nematus betulæ, *H.* N. betularius, *H.* N. dorsatus, *Cam.* N. acuminatus, *Th.* N. fraxini, *H.* N. poecilonotus, *Zad.* N. dispar, *Zad.*

Cryptocampus quadrum, *Costa.*

Cladius padi, *L.* Blennocampa betulæ, *Kl.*

Cimbex femorata, *L.*

Trichiosoma lucorum, *L.*

Hylotoma ustulata, *L.* H. pullata, *Z.*

Betula alba (continued).
Lyda betulæ, *L.*
Xiphydria annulata, *Jur.* X. camelus, *L.*
Pinicola pusilla, *Dal.*

Alnus.
Tenthredo viridis, *L.* T. picta, *Kl.*
Allantus arcuatus, *Forster.*
Poecilosoma pulveratum, *Retz.*
Eriocampa ovata, *L.*
Phyllotoma melanopyga, *Kl.*
Fenusa melanopoda, *C.*
Dineura alni, *L.*
Camponiscus luridiventris, *Fall.*
Crœsus varus, *Vill.* C. septentrionalis, *L.*
Nematus luteus, *L.* N. bilineatus, *Kl.* N. abdominalis, *F.* N. glutinosæ, *Cam.*
Cimbex connata, *Schr.* C. axillaris, *L.*
Lyda depressa, *Schr.*

Fagus sylvatica.
Nematus fagi, *Zad.*
Cimbex femorata, *L.*

Corylus Avellana.
Crœsus septentrionalis, *L.*
Nematus togatus, *Zad.*

Quercus Robur, cerris.
Emphytus cerris, *Kl.* E. serotinus, *Kl.* E. succinctus, *Kl.* E. tibialis, *Pz.*
Phyllœcus cynos bati, *L.*
Blennocampa pubescens, *Zad.* B. lineolata, *Kl.* B. melanocephala, *Fab.*
Eriocampa annulipes, *Kl.*
Fenusa pygmæa, *Kl.*

Juniperus communis.
Nematus, sp.
Monoctenus juniperi, *Lin.* M. obscuratus, *H.*

Pinus, Larix, Abies, &c.
Lophyrus variegatus, *Htg.* L. politus, *Kl.* L. elongatulus, *Kl.* L. rufus, *Kl.* L. socius, *Kl.* L. pallidus, *Kl.* L. virens, *Kl.* L. hercyniæ, *H.*

Pinus, Larix, Abies (continued).
L. polytoma, *H.* L. similis, *H.* L. nemorum, *Fab.*
L. pini, *L.*
Monoctenus juniperi, *L.* (?)
Nematus Erichsoni, *H.* N. insignis, *Sax.* N. carinatus, *H.* N. laricis, *H.* N. ambiguus, *Fall.* N. scutellatus, *H.* N. Saxesenii, *H.* N. nigriceps, *H.* N. compressus, *H.* N. abietum, *H.*
Lyda erythrocephala, *L.* L. stellata, *Christ.* L. campestris, *L.* L. reticulata, *L.* L. hypotrophica, *Htg.*
Iris. Monophadnus iridis, *Kalt.*
Convallaria multiflora. Phymatocera aterrima, *Kl.*
Festuca pratensis. Dolerus gonagra, *F.* Dolerus fissus, *Htg.*
Nematus conductus, *Ruthe.*
Poa aquatica. Selandria sixii, *Voll.*
Scirpus palustris. Selandria sixii, *Voll.*
Iriticum vulgare. Cephus pygmæa, *L.*
Juncus effusus, &c. Dolerus eglanteriæ, *Kl.* D. hæmatodes, *Schr.*
Selandria sixii, *Voll.*
Arundo Phragmites. Cephus arundinis, *Giraud.*
Carex acuta, &c.
Nematus capreæ, *Pz.*
Selandria sixii, *Voll.*
Pteris aquilina.
Tenthredo balteata, *Kl.*
Strongylogaster cingulatus, *Fab.*
Polystichum Filix-mas.
Strongylogaster delicatulus, *Fall.*
Str. cingulatus, *F.*
S. femoralis, *Cam.*
S. mixtus, *Kl.* S. Sharpi, *Cam.*
S. maculatus, *Kl.*
S. filices, *Kl.*
Selandria analis, *Thoms.*

Abstract.

	Tenthredinides.	*Selandriades.*	*Dolerides.*	*Nematides.*	*Cimbicides.*	*Hylotomides.*	*Lophyrides.*	*Pinicolina.*	*Lydina.*	*Cephina.*	*Total.*
Ranunculaceæ	...	3	...	3	2	...	...	...	...	...	8
Berberidaceæ...............	...	...	...	...	...	1	...	...	...	...	1
Cruciferæ	2	6	...	...	...	...	...	...	...	...	8
Violaceæ.....................	...	1	...	...	...	...	...	...	...	...	1
Tiliaceæ	...	2	...	...	...	...	...	...	...	...	2
Hypericaceæ	1	...	...	...	...	...	...	...	...	...	1
Aceraceæ	...	1	...	...	...	...	...	...	...	...	1
Geraniaceæ	...	1	...	...	...	...	...	...	...	...	1
Balsamineæ	1	...	...	...	...	...	...	...	...	...	1
Leguminosæ	2	1	...	2	...	...	...	...	...	...	5
Rosaceæ	4	18	...	11	3	7	...	...	2	3	48
Onagraceæ..................	1	...	...	...	...	...	...	...	...	...	1
Grossulariaceæ	...	1	...	3	...	...	...	...	...	...	4
Umbelliferæ	4	...	...	...	...	...	...	...	1	...	5
Caprifoliaceæ..............	5	1	...	...	3	...	...	...	...	...	9
Valerianaceæ...............	1	...	...	...	...	...	...	...	...	...	1
Dipsacaceæ	1	...	...	...	1	...	...	...	...	...	2
Compositæ..................	4	1	...	...	...	...	...	...	...	...	5
Vacciniaceæ	...	...	...	3	...	...	...	...	...	...	3
Oleaceæ	4	3	...	...	...	...	...	...	...	...	7
Scrophulariaceæ	3	2	...	...	...	...	...	...	...	...	5
Labiatæ	1	1	...	1	...	...	...	...	...	...	3
Primulaceæ	...	1	...	...	...	...	...	...	...	...	1
Plantaginaceæ	1	...	...	...	...	...	...	...	...	...	1
Polygonaceæ................	...	2	...	1	...	...	...	...	...	...	3
Euphorbiaceæ	1	...	...	...	...	...	...	...	...	...	1
Urticaceæ	1	...	...	...	...	...	...	...	...	...	1
Ulmaceæ.....................	...	1	...	2	...	...	...	...	...	...	3
Betulaceæ	2	7	...	19	3	2	...	1	1	...	35
Salicaceæ	1	4	...	46	3	6	...	...	1	...	61
Cupuliferæ..................	...	9	...	3	1	...	...	...	...	1	14
Coniferæ.....................	...	...	...	11	...	...	14*	...	5	...	30*(36)
Iridaceæ	1	1	...	...	...	...	...	...	...	...	2
Liliaceæ	...	1	...	...	...	...	...	...	...	...	1
Juncaceæ	...	1	3	...	...	...	...	..	...	...	4
Cyperaceæ	...	1	...	1	...	...	...	...	...	...	2
Gramineæ	...	1	2	...	...	...	...	...	...	2	5
Filices	...	6	...	...	...	...	...	...	...	...	6

* There are 20 European species, but the larvæ of only 14 have been described.

Unlike the perfect insects the larvæ exhibit great diversity in habits. Many live solitary, others again are gregarious. Not a few feed exposed in the sunshine, while others eat only in the cool of the evening, or at night. The great majority feed exposed, but some are internal feeders. Thus, several species of *Nematus* and one of *Hoplocampa* inhabit galls raised by the parent; a *Cryptocampus* and *Poecilosoma canditatum* live boring in the pith of plants; the *Phyllotomides* are leaf miners, and *Hoplocampa testudina* and *H. brevis* live in fruits. Different species of *Lyda* roll down leaves, and keep them together with silken threads; *Nematus leucostictus*, &c., reside in leaves folded down by the imago; *Lyda inanita* in a case formed of bits of leaves fastened together, and which it carries along with it.

Their bodies are mostly cylindrical, but those which feed on the surface of the leaf are flat; those which mine leaves have them very flat, the head triangular and the legs little developed. Some of them have a habit of rolling up the body in a spiral, the tail being in the centre and often upturned. They rest in this position on the leaves, while others, if they be alarmed, drop to the ground, and rest there motionless, rolled up in a ball, until all danger is gone.

The head of the larva is roundish, seldom depressed in the middle. Sometimes it can be partly retracted into the over-arching folds of the second segment. There is a single ocellus on either side. Between them and the mandibles are short, often microscopic, antennæ, which have three to seven joints, the last being the number with *Lyda*, which has them comparatively long; and, unlike their position with the other genera, they are placed pretty close to the eyes. The labrum is incised in the middle, the mandibles are short, thick, horny, and variously toothed. The maxilla are bilobed, the two lobes being in most cases closely united, and the inner one is provided with blunt teeth varying from ten to twenty and upwards in number (Pl. VI, fig. 3, 3). They are of a fleshy consistency, save with *Lophyrus*, with which they are harder and more horny. They are provided with jointed, thickish palpi, having from three to five joints (l. c., fig. 3, 1). The labium is thick and fleshy, and bears short three-jointed palpi, as well as a spinneret, which may be placed either close to the apex, or not far from the bottom.

On the thorax are three pairs of jointed legs which terminate in curved horny claws. There are also, on the ventral segments, pro- or false legs, which are in fact mere muscular protuberances. Of these there are six to eight pairs. In the latter case there will be a leg for every segment of the body, save the fourth, which in no case bears appendages. They have never the clasps found in the pro-legs of *Lepidoptera.*

In bearing ventral legs, and generally in their mode of life, Saw-fly larvæ have a considerable resemblance to the caterpillars of *Lepidoptera,* for which they are often mistaken. They differ, however, from them in two important points—in having only one ocellus on either side of the head, while lepidopterous larvæ have several; and in having a greater number of ventral legs, ten (or sixteen in all) being the greatest number with *Lepidoptera,* while, as stated above, Saw-fly larvæ have from eighteen to twenty-two legs. They differ too in the position of the legs, the caterpillars never having a pair on the fifth segment, which always bears one with the *Tenthredinidæ,* if the abdomen has legs at all. *Lyda* has no ventral legs, thereby agreeing with the *Siricidæ.* With most genera, the abdomen carries on the last segment two cerci, which are especially long with *Lyda,* while with other species they are differently coloured from the surrounding parts.

Mostly bare, or at least with the skin wrinkled; in other cases, the larvæ are covered with tubercles, each of which ends in a soft or bristly hair, which becomes in *Hoplocampa* and *Blennocampa* converted into a large branching spine.

It has been shown by recent researches that the coloration of caterpillars is protective, and that the coloration is of two kinds. On the one hand it has been shown that larvæ which are readily eaten by insectivorous animals are always coloured to resemble their surroundings, and that they conceal themselves as much as possible; while on the other, it has been proved that larvæ which are inedible through possessing bad secretions, &c., are brightly coloured, and are often more or less hairy. The same law of coloration applies to the larvæ of the *Tenthredinidæ;* and the similarity in coloration between them and the caterpillars (especially with the edible larvæ) is not unfrequently very close. This is more particularly the case with those which feed on narrow-leaved plants like pines and grasses.

The larvæ possess various means of escaping from their numerous enemies. A large number escape by the colour of their bodies harmonising with the surroundings; thus they are not readily seen, especially as they are inactive and solitary in habits. Those with flat bodies feed on the underside of the leaves (*Nematus luteus*, *Camponiscus*, &c.), in which they eat holes, and many feed only at night. They are all green, save that the head may bear blackish, or brownish markings, and, as a rule, the tinge of green agrees with that of the leaf *e. g. Nematus pallescens.* Many of the larvæ with cylindrical bodies are attached to narrow-leaved plants such as grasses, pines, &c. They also are green like the flat larvæ, but they bear, either on the back or down the sides, white or, more rarely, pink stripes. The green larvæ, which feed on broad-leaved plants (willows, &c.), eat along the edge of the leaf, eating in it semicircular indentations, the form of which they follow with the body, which is kept closely pressed to the edge. Those larvæ are never hairy, but some of the green flat larvæ bear over the legs, or over the whole body, soft pale hairs, the object of which seems to be to prevent the body throwing a shadow on the leaf, and thus leading to the detection of the larvæ. Obviously larvæ which live on trees cannot so readily escape by dropping to the ground as those attached to low plants. In fact they seldom or never drop down; many of them too feed only at night, but the species of *Nematus* can defend themselves by whipping about the abdomen. This is a habit possessed by all those which feed on the edge of the leaf, but it is more noticeable with gregarious species like *Crœsus septentrionalis*. Grass and herbage-feeding species again feed on the underside of the leaf on broad-leaved plants, or along the edge of grasses, and they drop to the ground at once, remaining there motionless rolled up in a ball until they think danger is over. Species of *Taxonus* and *Tenthredo* afford examples of this habit.

The active means of defence consist in ejecting liquids from lateral pores, or from the mouth, or in giving off odours from glands (generally abdominal). The *Cimbicina* possess the first mentioned peculiarity. The liquid is of an acid nature, and it can be ejected to a considerable distance and in some quantity, although after three or four discharges the supply becomes exhausted for a time. Its principal use is no doubt against ichneumons, and this, in at least one case, is the purpose of the liquid ejected from the mouth. The larva of *Perga Lewisii*, for instance, can throw out to some distance a quantity of gummy matter, the use of which is clearly shown by an ichneumon having been found with its wings and legs gummed together by it.

Larvæ which give out secretions or fetid odours are gregarious, several feeding on the same leaf, often ranged in a row with the bodies stuck out in the air. They have nearly always bright colours; the ground colour, as a rule, is some tinge of green, or even blue, and the first and last segments are yellow or orange, while the rest of the body is ornamented with yellow and black spots which often end in stiff hairs. The belly, too, may bear black marks, but only in such cases where there are glands, which the larva can exsert at will, and when it has the habit of throwing the abdomen over the head (as does *Crœsus*) for the double purpose of exposing the glands, and whipping away ichneumous. That the larvæ can drive away these insects by means of the abdomen, I have noticed more than once with *Crœsus septentrionalis.*

Many greenish-coloured larvæ give out odours and secretions, but they differ in habits from those just described. They are small larvæ with flat bodies; they feed on the upper side of the leaf, eating only the cuticle, so that in this way it becomes white. Now, as these larvæ are gregarious, and are not only covered with secretions, but can also give out bad smells, they are enabled to surround themselves with a fetid atmosphere, which makes their presence as effectually known as if they had bodies of bright contrasting colours.

A priori we might expect that species which are very closely related and similarly marked as imagines would also resemble each other in larvæ. But no conclusion could be more astray from the actual state of the facts. There are, indeed, some genera and groups in particular genera in which the larvæ and imagines are coloured and marked alike in the embryonic and developed states, such as, for instance, with *Dineura* (so far as we know), but others which closely resemble each other in the imago form are utterly dissimilar in the early one. A striking example of this is found in *Crœsus.* The larvæ of the three British species have the same forms and the same habits, but as regards coloration they are utterly distinct. This difference in coloration is, I think, readily explainable by the larvæ of *C. septentrionalis* and *C. latipes* being more active and more offensive, as is shown by the bad odours they give out. *C. varus,* on the contrary, is not quite so active, and does not use the ventral glands so effectively, but to make up for this it is of the same green as the alder with only a few slight black lines along the sides. Now, as is well known, the three imagos are very similar, and were considered varieties of one species before the larvæ were known. Again, with the *luteus* group of *Nematus* four of the larvæ are flat and green, while a fifth is cylindrical and reddish. We find the same diversity with the dermal covering. In *Eriocampa* we have slimy larvæ, slimeless larvæ, and one covered with a white flaky substance. *Hoplocampa* has spiny larvæ, smooth colourless larvæ living in fruits, and gall-living larvæ. The same diversity exists in *Blennocampa.* Some very distinct larvæ, indeed, produce imagos which can scarcely be distinguished from each other, *e.g.* *Lophyrus pini* and *L. similis*, *Nematus cadderensis*, *N. fagi*, and *N. fulvus*, and others. Contrariwise there are similarly-marked larvæ which give issue to very different flies.

It thus becomes clear that the forms and habits of larvæ are entirely of an adaptive nature, and bear no relationship with the habits, forms, and affinities of the perfect insects. Each lives in a different sphere and has a different food, has to contend against different enemies, and lives in entirely different surroundings from the other. The lives of the flies, too, are very uniform. Their chief business is to provide for the continuance of the species ; when that has been done they either die at once, or live a useless, lazy existence for a few days, basking in the sunshine.

In his *Clavis*, Dahlbom has given a classification of the Saw-fly larvæ, which Westwood has reproduced with additions in his Intr.* and Ent. Ann.† for 1862. The following synopsis is carried out on the same lines, but in much greater detail.

Synopsis of Larvæ.

I. Larva with twenty-two legs.

A. Ejecting from lateral pores a greenish acid liquid, spinning a double cocoon.

---

* ii, p. 97.

† P. 129.

1. Greenish larvæ, without markings, covered more or less (especially when young) with a whitish exudation. *Trichiosoma, Clavellaria, Cimbex.*

2. Not greenish, with orange and other markings. *Abia, Zaræa.*

B. Not ejecting a liquid from lateral pores. Spinning a simple close cocoon, not ejecting a liquid from the mouth, often giving out a resinous exudation, often social, never rolling themselves up into a ball, and always attached to *Coniferæ* or juniper. *Lophyrus, Monoctenus.*

1. Greenish (rarely blackish or brownish) larvæ without definitely arranged spots or markings, sometimes with lines proceeding from the centre of the back to the sides in the direction of the tail; generally lighter on the sides than on the back, resting with the body rolled up into a ball, often changing colour before pupating.

a. Pupating in stems, never with lines down the back; generally dark green on the back and dirty white on the sides. *Emphytus, Taxonus, Poecilosoma luteolum.*

b. Pupating in the earth, with or without spinning a cocoon, sometimes with lines arranged down the back; often ejecting from the mouth a brownish liquid when alarmed. *Tenthredo, Macrophya, Allantus.*

c. Larvæ for the greater part white and covered with a whitish exudation.

i. Head reddish-yellow, feeding on oak. *Emphytus serotinus.*

ii. Head not reddish, feeding on alder.

The exudation in flakes, covering all the body—spinning a cocoon—becoming pale green at last moult. *Eriocampa ovata.*

The exudation powdery, not spinning a cocoon, losing the exudation and becoming pale green before pupating. *Poecilosoma pulveratum.*

2. Greenish larvæ without regularly arranged stripes or spots, not resting rolled up into a ball, usually

spinning a cocoon mixed with grains of earth, usually stout, thick-set, sluggish, and generally feeding on the flat surface of the leaf.

a. Feeding on ferns.

i. Body bare.

Head ochreous, spinning a cocoon. *Selandria analis.*

Head greenish with two blackish spots, not spinning a cocoon. *Strongylogaster cingulatus.*

ii. Body covered with short hairs, head green, without markings. *Strongylogaster delicatulus.*

b. Living in the rolled down leaves of the rose. *Blennocampa pusilla.*

c. Covered with a slimy secretion, eating only the upper epidermis.

i. The secretion well developed and of a greenish or blackish colour, feeding on fruit trees, limes, birch, or hawthorn. *Eriocampa adumbrata, E. annulipes.*

ii. The secretion not well developed, and of a yellowish colour, feeding on rose. *Eriocampa caninæ* (*æthiops*, West.).

d. Feeding on herbaceous plants or grasses, eating along the edge of the leaf. Small and stumpy in shape. *Blennocampa albipes. Selandria sixii.*

e. Feeding in the stems of plants. *Poecilosoma candidatum.*

f. Feeding in the berries of gooseberries, in apples, and plums. *Hoplocampa fulvicornis, H. testudinea.*

3. Greenish larvæ covered with branched spines.

a. Spines green. *Blennocampa alchemillæ, B. longicornis.*

b. Spines blackish. *Blennocampa lineolata, B. melanocephala, Hoplocampa brevis.*

4. Blackish larvæ without white markings, feeding on cruciferous plants. *Athalia spinarum, A. glabricollis.*

5. Black with white dots, feeding on *Scuttellaria. Athalia scutellariæ.*

6. Flat larvæ, with triangular heads, and usually with black plates on thorax, mining the leaves of plants. *Phyllotoma, Fenella, Fenusa, Dineura despecta, Blennocampa ulmi*, Kalt.

II. Larvæ with not more than twenty legs.

A. Larvæ with greenish-coloured bodies, without conspicuous markings, or with white, black, or pinkish continuous lines on back or sides.

a. Flat larvæ without dorsal or lateral lines, feeding on the upper or lower surface of the leaf.

i. Feeding on upper surface of the leaf, eating only the upper cuticle, and giving out a nauseous smell.

Body without hairs. *Dineura stilata.*

Body with fine hairs. *Dineura testaceipes, D. Degeeri.*

ii. Feeding on the lower side of the leaf, eating the leaf through and through, and not giving out a bad odour.

1. Onisciform, very broad and flat, the head retreating and depressed in the centre. *Camponiscus luridiventris.*

2. Body slender, head not retreating nor depressed in the middle. *Nematus luteus, N. bilineatus, N. abdominalis.*

b. Body cylindrical, rarely feeding on the flat surface of the leaf, without distinct markings, nor with contrasting colours.

i. Body covered with distinct tubercles each ending in a hair, feeding on the flat surface in which they eat large holes.

1. Body entirely green, spinning a close, oval, brownish, single cocoon in the earth. *Nematus pallescens.*

2. Body darker coloured on the back and upper half of the sides than on the lower part, spinning a loose, irregular, whitish, double cocoon.

Head light brown, body greenish. *Cladius padi.*

Head and body for the greater part black. *Cladius brullæi.*

ii. Body without tubercles or hairs, feeding along the edge of the leaf, with the body kept closely pressed to it and following its shape. Entirely green or with dorsal or lateral lines.

1. Body entirely green or green above, with the lower part of the sides of a paler tint. *Nematus ruficornis*, *N. rumicis*, *N. fulvipes.*

2. Body with black lateral lines. *Nematus crassus*, *N. miliaris.*

3. Body with white lateral or dorsal lines. *Nematus capreæ*, *N. curtispina*, *N. myosotidis*, *N. histrio*, *N. fallax.*

4. Body with pink lines. *N. curtispina*, *N. Bergmanni.*

5. Body with greenish tubercles. *N. glutinosæ.*

B. Bodies marked with black, blue, yellow, or orange, irregularly-disposed spots and lines; giving out generally a bad smell, and feeding on the edge of the leaf with the after part of the body stuck out in the air. *No tubercles or hairs.*

a. With distinct ventral glands.

Body black with orange legs. *Crœsus latipes.*

Body green with faint black lines. *Crœsus varus.*

Body green with orange markings. *Crœsus septentrionalis.*

b. Without distinct ventral glands.

i. Bodies greenish, marked with orange, &c. *Nematus fulvus*, *N. cadderensis*, *N. pavidus*, *N. betulæ*, *N. melanocephalus*, *N. salicis*, *N. conjugatus*, *N. lacteus*, *N. maculiger*, Cam.

ii. Body for the greater part reddish without any green.

1. Red with black marks down the back. *N. quercus.*

2. Red with white marks down the back. An unknown *Nematus* on birch.

3. Body dirty reddish-brown. *Nematus dorsatus*, *N. capreæ* (one form), *N. acuminatus.*

C. As in B, but body provided with distinct tubercles, each ending in a stiff longish hair.

a. Ground colour orange, with black marks, feeding in a row in company on the underside of the leaf, eating only the cuticle. *Cladius viminalis.*

b. Ground colour green, with yellow and black markings, feeding on the edge of the leaf. Throwing off the markings at the last moult; spinning a single cocoon. *Nematus ribesii, N. consobrinus.*

D. Leaf-rolling larvæ; folding down the edge of a leaf, thus forming a covering under which they live, and having anal segments ornamented with black markings. *Nematus crassulus, N. bipartitus,* Lep., *N. nigrolineatus.*

E. Gall-inhabiting larvæ.

a. Living in galls on leaves.

i. On willow.

1. In bean-shaped galls, ranged in numbers along each side of the midrib, and projecting from both sides of the leaf. *Nematus gallicola.*

In galls longer than broad, placed in pairs one on each side of the midrib, and projecting more on the upper than on the lower side. *Nematus ischnocerus.*

In large oval galls with a considerable internal cavity. *Nematus vesicator.*

2. In pea-shaped galls, attached by only a small part of their surface to the midrib and not at all to the blades.

Galls smooth, shining, glabrous, generally with pink or reddish cheeks; larva changing colour at the last moult. *N. viminalis, N. herbaceæ.*

Galls green, without red, and covered with longish hair. *N. viminalis, N. baccarum.*

ii. In pea-shaped galls on *Vaccinium vitis-idæa. N. vacciniellus.*

b. In galls on twigs of willows or poplars.

i. In large irregular galls on the twigs. *Cryptocampus pentandræ.*

ii. In the pith of the young twigs. *Cryptocampus saliceti, C. angustus.*

III. With eighteen (rarely twenty) legs. Spinning a double cocoon, the outer elastic and reticulated.

A. The skin covered with stiff hairs, each issuing from a tubercle. Yellowish on the back, with the tubercles black. *Hylotoma rosæ.*

Not yellow on the back, the tubercles in part yellow. *H. enodis.*

B. The skin not covered with stiff hairs.

a. Whitish, with the head and legs black, and the skin marked with black and luteous spots. *H. berberidis.*

b. Greenish.

With white longitudinal lines, and with twenty legs. *H. ustulata.*

With a yellow longitudinal line. *H. cæruleipennis.*

IV. Larvæ without any ventral legs, and with long seven- to eight-jointed antennæ.

A. Living socially between leaves spun together with silken lines.

a. Green or olive green larvæ. Living on *Pinus sylvestris. Lyda stellata, L. erythrocephala.*

b. Reddish larvæ. *Lyda pyri.*

B. Solitary larvæ.

a. Living in folded down leaves on birch and poplar. *L. sylvatica;* on alder, *L. depressa.*

b. Living on the rose in a case formed of pieces of leaves. *L. inanita.*

There is one other point in connection with the coloration of the larvæ which requires to be noted; namely, the striking change in coloration which many of them undergo immediately before pupating. In most cases the change is in the direction of a more obscure generally green coloration. Of this we have a good illustration with many species of *Nematus.* Other species become brownish, or slate-coloured, while with one or two the change of colour is towards a brightening of the tints. Along with the colour, all hairs, spines, &c., are thrown off, so that the difference between the two skins is often so great that very often the two forms are taken to belong to two distinct species. The reason of the change of dress seems to be this: When the larva has become full fed, it has to go in search of a suitable place wherein to pass the period of rest undisturbed; and this cannot be had on the food plant. Many of them pupate in pithy stems, without spinning any cocoon, while others seek such situations because their cocoons are thin. Hence they may have to travel some little distance before finding a proper place—a fact shown by finding their cocoons in stems, or under bark, many yards distant from the food plants. Now, when a larva descends from the food plant, it enters on a new mode of life, comes in contact with dangers to which it had not been accustomed to, and meets with new enemies. Thus a more obscure coloration would be of advantage, and that it is of use, I have observed with *Nematus viminalis*, which becomes slate-coloured before leaving the galls to pupate in the ground—the slate-colour harmonising admirably with the sand on the river-banks where it lives—as it does with the dried grass, &c., found in the meadows where other gall-making species of similar habits live. With *Cladius viminalis*, again, the colour at the last moult becomes more brilliant. In this case several larvæ live on a leaf side by side, and thus they are made visible; but when they become full fed they separate to seek a hiding place, which is generally under the bark of a growing tree, up the trunk of which they march. The increase of brightness in the colour thus is of advantage, as it makes the larvæ more readily seen, and seen, avoided, in the case of inedible larvæ.

A few larvæ would appear to be dimorphic. The larva of *Nematus capreæ* is mostly green, with white longitudinal lines, but there is a rare form of it with the body reddish. One or two species of *Cimbex* appear to have dimorphic larvæ also, but the subject requires further investigation.

When the larva has become full fed, it proceeds to pupate. Some larvæ spin no cocoon, but bore into the pithy stems, or into holes made by beetles in wood. Others form in the ground neatly rolled cells of earth, but most species spin oblong silken cocoons. The species of *Selandria*, &c., mix the silk with grains of earth. The *Cimbicides* spin double cocoons, an inner one inside an outer more tenacious covering, the inner one being separated from it by a clear space. Some species of *Nematus* likewise form double cocoons, but not all. Those of *Cladius* are irregular in shape, thin, and almost transparent. The outer case of the cocoon of *Clavellaria* is also of an open texture. *Cimbex* and *Trichiosoma* spin their cocoons on the branches of the food plants; *Nematus gallicola* in masses under chinks of bark on the food plant, *Cryptocampus pentandræ* in the galls; but most species spin them in the earth.

After being in the cocoon the larva in a short time shortens and contracts its shape, the legs at the same time being withdrawn into the skin as it were. The period which elapses between the spinning of the cocoon and becoming a pupa varies according to the season. With the summer broods it may be from seven to ten days, but the autumnal broods do not change until the following spring, so that the greater part of their larval existence is spent in this inert condition. In exceptional cases they may even remain two years in the cocoon before changing.

The larvæ are very much preyed upon by ichneumon and dipterous flies (*Tachina* and its allies). The ichneumons belong principally to the *Tryphonides*, which, indeed, would appear to be specially attached to saw-fly larvæ. *Braconidæ* are not often bred from them; the *Ophionides* are not uncommon, while many *Chalcididæ* as well as *Pimplides* are reared from the gall-making *Nemati*.

The Pupa

Bears a considerable resemblance to the perfect insect. The antennæ are placed along the front, the legs along the breast, while the wings appear as pad-like structures. Each appendage is enveloped in a thin pellicle. Green is the commonest colour in the pupal state. Sometimes there are yellow or orange spots on the abdomen, but only if these colours were present in the larva. The pupa state does not last over twelve or fourteen days, as a rule, and may be shorter. When the perfect state is reached the insect does not leave the cocoon until its wings, &c., have hardened, and the pupal skins have been got rid of. It quits the cocoon by cutting off one end, which is done in *Nematus*, &c., by cutting out the end roughly, but with *Lophyrus* and *Cimbex* a neat lid is cut, which remains attached to the cocoon by one end after the insect has left.

Generic and Specific Distinctions.

It must be said that it is not at all an easy matter to find characters that will differentiate clearly the larger groups and the genera, and even if we are able to do so with European species difficulties arise when exotic species are taken into account. Thus, *Strongylogaster* and *Selandria* are tolerably distinct and well defined if we only regard our own species, but when we come to arrange the Central American species all distinction between the two breaks down. Similarly, by following too closely the alar-cell structure in fixing the genera species otherwise dissimilar are placed together, and removed from among species with which they agree in other peculiarities of structure.

Peculiarities in the antennæ, thorax, legs, and abdomen appear to afford the best characters for defining the tribes. For the sub-tribes the neuration of the wings is of use. The genera may be defined by peculiarities in most parts of the body, but more especially in the (*a*) antennæ, as regards the number of the joints, their relative length, and their covering; (*b*) the neuration of the wings, and more especially the number of the radial and cubital cellules, the number and position of the recurrent nervures, the form of the lanceolate cellule, the form of the neuration, and the number of cellules in the hind wings. It will depend, however, very much on the group as to what value will be placed on any particular nervure or cellule. Thus, among the *Nematina* the first cubital nervure is often absent, either constantly in particular species or groups or occasionally with certain species, but its absence occurs in so many widely separated groups that no generic value can be placed on it. In the same way the posterior wings may have either one or no median cellule in different species in a genus, and even in different sexes of the same species. (*c*) The structure of the legs, *i.e.* whether they are armed with spurs or spines, provided with patellæ or not, the nature of the trochanters, coxæ, tarsi, &c. These I consider to be the characters of most value, but other parts of the body occasionally afford distinguishing points. For example, the form and position of the eyes, of the clypeus and other mouth organs, the structure of the thorax and abdomen. In some instances the ovipositor can be used for the same purpose.

The larvæ can be also used in classification. In this respect they are of great value in defining the tribes and subtribes. They do not appear to be of much use with the genera. A few genera, indeed, have well-marked larvæ, but in most cases their forms are too much of an adaptive nature to furnish generic characters. Thus, with *Eriocampa* we have slimy larvæ, slimeless larvæ, and larvæ covered with a white flaky substance. Both *Hoplocampa* and *Blennocampa* have spiny larvæ; in *Nematus* they are of all shapes and colours; while no distinction can be drawn between the larvæ of *Tenthredo* and *Allantus* or even *Dolerus*.

The discrimination of the species is often very difficult. Colour is the distinguishing mark which most readily catches the eye, and undoubtedly it is a valuable character, always provided that other points are not ignored, as unfortunately they too often are in descriptive works. The body is rarely sculptured, sometimes it is more or less pilose, but excellent characters are to be obtained from the antennæ, as to their length, thickness, pilosity, &c.; of the clypeus, as to whether it is truncated or incised at the apex; by the form of the head and its sutures; by the arrangement and position of the nervures in the wings; by the legs, as to the length of the spurs, of the tarsal joints, and the form of the spurs. Most of the specific characters, in fact, are slight morphological variations, which, so far as we can see, are of no use to the species; but in one organ we find a wonderful amount of variety in structural detail. This is in the saw, of which, indeed, it may be said that its form affords us an almost infallible criterion of specific distinctness. We can easily see why there should be so much variety of form in the saw when we consider not only how manifold are the modes of depositing the ova, but also how different in texture, &c., are the substances in which they are laid. And as the same species follows always the same mode of oviposition we can understand, also, how this organ scarcely or never varies in structure; for a variation, however slight in the shape of the teeth, &c., might prevent the eggs being sunk in the proper manner in the substance of the leaf, and thus might lead to the death of the embryo. Contrariwise, we find great variation in the other specific distinctions—in colour, sculpture, &c., because they are, so far at least as we can see, of secondary importance to the insects, and therefore variation has had some play.

3. DISTRIBUTION.

The *Tenthredinidæ* must be regarded as inhabitants of temperate, if not northern climates. This is more particularly the case with the *Nematina*, which are found as far north as Spitzbergen and Iceland, abound in the northern parts of Europe, but become very scarce towards the Mediterranean. Thus, Scotland has about seventy species of *Nematus*, and Italy only twelve, according to Costa, or a half more than what Iceland has. The *Tenthredina* are more widely distributed, being found commonly in the Palæarctic, Neoarctic, and Oriental regions. The *Cimbicides* are natives of the Neoarctic and Palæarctic regions, into which they penetrate pretty far north. Other tribes are peculiar to the Neotropical and Australian regions. As for the *Hylotomina* they are in great force in the Neotropical, and not uncommon in the Palæarctic and Neoarctic districts. *Lyda* seems to be confined to Europe and North America, although it is likewise found in Northern China.

A few species have a very wide range; thus, *Hylotoma pagana* is found in America, all over Europe into India and Japan. Many species are common to Northern Europe and America, *e.g. Hemichroa rufa, Nematus histrio. Athalia* has, for such a small genus, a very wide range. The common turnip species (*A. spinarum*) abounds all over Europe, from Lapland to the shores of the Mediterranean, and through Asia into Japan. Another species is found in South Africa, which would appear to be singularly poor in *Tenthredinidæ.*

4. COLLECTING AND PRESERVING.

For collecting these insects, a sweeping net and an umbrella for holding under bushes which are beaten into it are the most useful. They are to be sought for along hedges, the borders of fields, in marshy places for some *Doleri* and *Nemati*, and in woods containing oaks, birches, willows, and poplars. The sweeping net is of most use during the day when beating, especially if the day be bright and warm, produces little, for they fly away the moment the trees are touched. If the weather be dull, however, beating may be employed advantageously, as it can always be done in the evening.

They may be either pinned or mounted on cardboard. If pinned, and not set properly, the wings should be separated in such a way that the neuration can be easily examined. If the carding method be followed, the insects should be mounted in such a way that the form of the clypeus can be seen, and the hinder tarsi should be loose, so that the form of the claws can be conveniently seen. It is better, too, to have at least one specimen with one wing not gummed down.

The saws are best prepared for microscopical examination as follows:—They are extracted from the abdomen by pressing its sides, when they will project, and be easily cut off. The pieces should then be separated and steeped in turpentine for a day or two. Take a sheet of thin Bristol board, cut it into pieces, say six lines by nine, then punch in one end of this a round or square hole, say two and a half lines across. Next, fasten to one side of this hole a microscopic cover glass by means of Canada balsam dissolved in benzine. After this has dried, fill up half of the cell thus formed with balsam, spreading it as evenly as possible. In this arrange the parts of the saw, set the preparation aside for a day, then fill up with balsam until the cell overflows, and put on another cover glass. All that now remains to be done is to keep the preparation in a flat position until the balsam has dried, after which it is labelled and a pin stuck through the cardboard, by means of which it is placed in the cabinet along side the insect from which the saw was taken.

For the examination of the saw a quarter-inch objective is the best; if lower powers are used some of the details are apt to be overlooked. The mouth organs and other portions of the body can be mounted in the same way.

The larvæ may be reared in the customary methods followed by lepidopterists. Owing to so many of them remaining over the winter as unchanged larvæ, they are not always easily reared, but no special difficulties are met with in dealing with the summer broods, which pass rapidly through the larval and pupal stages.

They may be preserved for the cabinet by holding them, after being placed in a pill box which is enclosed in a tin canister, over the flame of a paraffine lamp or over the gas for a minute or two, when they will become perfectly hard. If proper care be taken, fairly satisfactory specimens may, by this plan, be obtained, provided that only fully grown specimens, with empty food canals, are operated upon. The preserved larvæ are perhaps kept best on pins stuck through cardboard, another and stronger pin being stuck in this, and by it kept in position in the cabinet.

5. CLASSIFICATION.

The first who attempted the classification of the *Tenthredinidæ* on an extensive scale was the English naturalist, W. E. Leach (Zoological Miscellany, vol. iii). He divided the family into nine "stirpes," two of which were grounded on Australian forms. Stirpe 1 contained *Cimbex*, *Trichiosoma*, *Clavellaria*, *Zaræa*, and *Abia*. Stirpes 2 and 3 were formed for the Australian genera *Perga* and *Pterygophorus* respectively. Stirpe 4 had one genus, *Lophyrus*, 5 two, *Hylotoma* and *Cryptus*; 6 had four, *Messa*, *Athalia*, *Selandria*, and *Fenusa*; 7 included *Allantus*, *Tenthredo*, *Dosytheus*, *Dolerus*, and *Emphytus*; 8 *Cœesus* and *Nematus*; and 9 *Tarpa* and *Lyda*. Saint Fargeau (Mon. Tenth.) had an arrangement of his own, but, as it is very artificial, it is unnecessary to allude to it further here. The Swedish entomologist, Dahlbom (Prod. Hym. Sc.), arranged the Swedish species in fifteen genera, namely, *Cimbex*, *Athalia*, *Hylotoma*, *Cyphona*, *Lophyrus*, *Monoctenus*, *Cladius*, *Priophorus*, *Nematus*, *Tenthredo*, *Dineura*, *Emphytus*, *Dolerus*, *Phyllotoma*, *Lyda*.

James Francis Stephens, in vol. vii of his 'Illustrations of British Entomology,' described all the British genera and species known by him to inhabit Britain. This work, however, was by no means a critical one as regards the discrimination of the species, but as he gave, in most cases, the original descriptions, many of which were not readily obtainable, it was, on the whole, a work of some utility to the British Entomologist. Stephens' classification was as follows:—*Cimbex* with 8 British species, *Trichiosoma* 9, *Clavellaria* 2, *Zaræa* 1, *Abia* 2, *Amasis* 2, *Hylotoma* 15, *Schizocerus* 2, *Lophyrus* 3, *Cladius* 1, *Pristiphora* 9, *Nematus* 45, *Crœsus* 3, *Messa* 1, *Fenusa* 3, *Athalia* 10, *Selandria* 40, *Hemichroa* 3, *Sciapteryx* 1, *Allantus* 47, *Tenthredo* 28, *Dosytheus* 14, *Dolerus* 9, *Emphytus* 20, *Heterarthrus* 1, *Melicerta* 1, *Tarpa* 2, and *Lyda* 21 species, or a total of 309 British species.

Hartig (following Klug), in his 'Blattwespen,' distributed the species into thirteen "genera," and each genus was again divided into sub-genera, these into "sections" and the "section" into "tribes." Each division received a name, so that, on this arrangement, the nomenclature of a species was rather cumbersome. Thus the *Tenthredo albipes* of Linné became *Tenthredo*, *Allantus*, *Selandria*, *Blennocampa*, *Monophadnus albipes*. In fact, his "genera" are equivalent to the "tribes" of recent authors; and his sections and tribes have become genera. He arranged the genera (= tribes or sub-families) thus:—*Cimbex*, *Blasticotoma*, *Hylotoma*, *Lophyrus*, *Cladius*, *Nematus*, *Dineura*, *Dolerus*, *Emphytus*, *Tenthredo*, *Tarpa*, *Lyda*, *Xyela*.

Westwood (Introd., ii, 113) introduced an improvement in the classification of the family by dividing it into named sub-families. Of these he made four:

"1. *Cimbicides.*—Antennæ short, clavate, with not more than eight joints, larvæ 22-footed, emitting drops of viscid matter from the pores of the body (*Cimbex, Perga, &c.*).

"2. *Hylotomides.* — Antennæ 3-jointed, terminal joint greatly elongated, labrum apparent, larvæ with eighteen to twenty legs, not emitting drops of viscid matter (*Hylotoma*).

"3. *Tenthredinides.*—Antennæ 9- to 14-jointed, simple, filiform to the tip; labrum apparent, saws with parallel sides (*Tenthredo, Nematus, Dolerus, Selandria*, &c.).

"4. *Lydides.*—Antennæ multi-articulate, sometimes strongly pectinated in the males; posterior tibiæ often spined in the centre; labrum minute, saws but slightly serrated at the tip, strongly dilated and elbowed at the base, larvæ various (*Lyda, Tarpa*, and *Lophyrus*)."

Athalia was stated to form a connecting link between the *Hylotomides* and the *Tenthredinides*, while *Cephus, Xyela*, and *Blasticotoma* were indicated as worthy of elevation into sub-family rank.

C. G. Thomson (Hymen. Scand., i) has carried out still further Westwood's idea. He grouped the genera into seven tribes:—*Cimbicina, Hylotomina, Tenthredina, Blasticotomina, Lydina, Xyelina*, and *Cephina*. In thus distributing them he relied principally on the form of the antennæ, legs, and abdomen.

Zaddach (Schr. Ges. König, xvi) has separated *Nematus* and its allies from the *Tenthredina*, among which they were included by Thomson, and formed them into a distinct sub-family. He seems also to indicate that *Lophyrus* should form a tribe, or at any rate that it should not be united with the *Tenthredina*.

The fact that *Nematus* and its allies have, as larvæ, only twenty legs, while the *Tenthredina* have twenty-two, is an important distinction; yet it is very difficult to find characters to separate the two divisions in the perfect state. *Hoplocampa* might, for example, be ranged with *Dineura*, with which it agrees in the form of the antennæ and in the position of the basal nervure, while it differs in both of these points from *Blennocampa*, &c. The only absolute distinction is that the second cubital cellule receives both recurrent nervures in the *Nematina*.

Lophyrus appears to me to possess sufficient distinctive characters to merit its being formed into a tribe.

As to the grouping of the tribes I certainly think that the affinities of *Lophyrus* are with *Tarpa* and *Lyda* rather than with the *Tenthredina*. Its relationship with *Cladius*, near to which it is more often placed, is not very great; the similarity of the antennæ in the males, so far as it goes, cannot be regarded as of great value, being merely a sexual character. *Pterygophorus*, again, unites *Lophyrus* with *Hylotoma*, as does also *Brachytoma*, and one or two undescribed genera known to me. On the other hand, the distance between *Hylotoma* and the *Cimbicides* is bridged by such genera as *Syzygonia* and *Incalia*, which again are related to *Brachytoma*, especially in body form and in the formation of the trophi, in which the number of joints is reduced, thereby approximating with the *Siricidæ*. In these tribes we find spined tibiæ, as in *Lyda*, and appendicular cellules in the forewings, neither of which exist with the *Tenthredina*. Besides that, *Lophyrus*, *Cimbex*, and *Hylotoma* agree with *Lyda* and the *Siricidæ* in the form of the metathorax. The only partial exception to this is *Monoctenus*, which, however, differs from *Cladius* in the form of the antennæ, and in its larva having twenty-two legs.

I would then divide the family in the first place into two divisions: division 1 containing the *Tenthredina*, *Nematina*, *Hylotomina*, *Cimbicina*, and *Lophyrina*, all distinguished by the larvæ having six or more ventral legs; the second division will include the *Lydina*, distinguished, *inter alia*, by the larvæ wanting abdominal legs. The first section I would arrange in two series. On the one hand, *Tenthredina* and *Nematina* a homogeneous section, on the other *Cimbicina*, *Hylotomina*, and *Lophyrina*, three sharply cut off groups, but having more connecting links between themselves than with either *Tenthredina* or *Nematina*. This arrangement may be tabulated as follows:

I. Larvæ with ventral legs. Prothorax emarginate behind. Middle lobe of mesonotum much longer than broad, not separated from scutellum by a deep fovea. Basal nervure not received in first cubital cellule.
  A. Fore lobes of metanotum well developed, so that the cenchri are separated from the scutellum by a comparatively wide space.
    1. Larvæ with twenty-two legs. Fore wings with two radial cellules. Second and third cubital cellules receiving each a recurrent nervure. Lanceolate cellule rarely petiolate. Antennæ usually 9-jointed, rarely 7—15. *Tenthredina.*
    2. Larvæ with twenty legs. Fore wings with one, rarely with two radial cellules. Second (or first when there are only three) receiving both recurrent nervures. Lanceolate cellule petiolate, rarely constricted. Antennæ 9-jointed. *Nematina.*
  B. Fore lobes of metathorax not well developed, cenchri almost touching scutellum.
    1. Antennæ clavate. Sides of abdomen acute. Larvæ with twenty-two legs, ejecting an acid liquid from lateral pores. *Cimbicina.*
    2. Antennæ 3-jointed. Fore wings with one radial cellule, usually appendiculate. Tibiæ spined. Larvæ with eighteen to twenty legs. *Hylotomina.*
    3. Antennæ multiarticulate, serrate in ♀, flabellate in ♂. Larvæ with twenty-two legs. *Lophyrina.**

II. Larvæ without ventral legs. Basal nervure received in the first cubital cellule. Middle lobe of mesonotum not much longer than broad, and separated from the scutellum by a deep fovea. Pronotum subtruncate at its hind margin. Tibiæ spined.
  Antennæ setaceous, multiarticulate. Abdomen depressed. Terebra not exserted. *Lydina.*
  Antennæ 12-jointed, the third very much larger than any of the others. Terebra exserted. *Pinicolina.*

---

* *Blasticotoma*, Kl. (not a British insect), will form another division of this section, distinguished by its exserted ovipositor, 4-jointed antennæ, of which the third is the largest, and by the basal nerve being received in the first cubital cellule.

Analytical table of the Genera.

1 (19) Wings with one radial cellule.
2 (7) Antennæ with only three joints.
3 (4) Fore wings with an appendicular cellule, hinder tibiæ with a spine. ♂ with simple antennæ. *Hylotoma.*
4 (3) No appendicular cellule in fore wings, nor spine on tibiæ. ♂ antennæ cleft.
5 (6) Lanceolate cellule petiolate. *Schizocera.*
6 (5) Lanceolate cellule contracted. *Cyphona.*
7 (16) Antennæ 9-jointed.
8 (11) Lanceolate cellule contracted.
9 (10) Third cubital cellule receiving the second recurrent nervure. *Cladius.*
10 (9) Second cubital cellule receiving the second (and first) recurrent nervure. *Camponiscus.*
11 (8) Lanceolate cellule petiolate.
12 (13) Hinder tarsi broadly expanded and flattened. *Crœsus.*
13 (12) Hinder tarsi simple.
14 (15) Wings with three or four cubital cellules, if three the first receiving both recurrent nervures. *Nematus.*
15 (14) Wings with three cubital cellules, the second receiving both recurrent nervures. *Cryptocampus.*
16 (7) Antennæ serrate, with more than 9-joints, ♂ antennæ flabellate.
17 (18) Lanceolate cellule divided by an oblique cross nervure. *Lophyrus.*
18 (17) Lanceolate cellule contracted in the middle. *Monoctenus.*
19 (1) Wings with two radial cellules.
20 (47) Fore wings with three cubital cellules. Tibiæ not spined (83).
21 (32) Antennæ clavate, 5-6-jointed.
22 (25) Antennæ 5-jointed.
23 (24) Posterior coxæ toothed, blotch absent, body hairy. *Trichiosoma.*
24 (23) Posterior coxæ not toothed, blotch present, body not hairy. *Cimbex.*
25 (22) Antennæ 6-jointed.
26 (27) Lanceolate cellule with a straight cross nervure. *Clavellaria.*
27 (26) Lanceolate cellule contracted.
28 (31) First cubital cellule receiving the two recurrent nervures, eyes diverging beneath.
29 (30) Abdomen with a white band at the base. *Zaræa.*
30 (29) Abdomen without a white band. *Abia.*
31 (28) First cubital cellule receiving only one recurrent nervure, eyes converging. *Amasis.*
32 (33) Antennæ 7-8-jointed, not clavate. *Cœnoneura.*
33 (44) Antennæ 9-jointed.
34 (41) With three cubital cellules, first receiving a recurrent nervure.
35 (36) Lanceolate cellule petiolate. *Fenusa.*
36 (35) Lanceolate cellule with oblique cross nervure.
37 (38) No middle cellule in hind wings. *Emphytus.*
38 (37) One middle cellule in hind wings.
39 (40) Costa and stigma white, antennæ with third and fourth joints subequal. *Harpiphorus.*

40 (39) Costa and stigma black or fuscous, third joint of antennæ distinctly longer than fourth. *Poecilosoma* (in part).
41 (34) First cubital cellule receiving no recurrent nervure, two middle cellules in posterior wings.
42 (43) Lanceolate cellule with oblique cross nervure. *Dolerus*.
43 (42) Lanceolate cellule petiolate. *Dineura fuscula* var.
44 (33) Antennæ 10-16-jointed.
45 (46) Lanceolate cellule petiolate. *Fenella*.
46 (45) Lanceolate cellule with an oblique cross nervure. *Phyllotoma*.
47 (83) Wings with four cubital cellules.
48 (51) Second cubital cellule receiving both recurrent nervures.
49 (50) Lanceolate cellule petiolate. *Dineura*.
50 (49) Lanceolate cellule contracted. *Hemichroa*.
51 (48) Second cellule receiving only one nervure.
52 (53) Antennæ 10-jointed, subclavate. *Athalia*.
53 (52) Antennæ 9-jointed, mostly filiform.
54 (55) Lanceolate cellule petiolate. *Blennocampa*.
55 (61) Lanceolate cellule contracted.
56 (57) Antennæ short, thick, mesonotum not marked with white. *Hoplocampa*.
57 (56) Antennæ long, filiform, mesonotum and metanotum with white marks. *Synærema*.
58 (61) Lanceolate cellule open, without cross nervure.
59 (60) Body short, thick, costa thickened and dilated before stigma. *Selandria*.
60 (59) Body longish, cylindrical, costa not dilated. *Strongylogaster*.
61 (69) Lanceolate cellule with an oblique cross nervure.
62 (63) Hind wings with no middle cellule. *Taxonus*.
63 (64) Hind wings with one middle cellule.
64 (65) Eyes reaching to base of mandibles, abdomen black. *Eriocampa* in part.
65 (64) Eyes not reaching to base of mandibles, abdomen spotted with white. *Poecilosoma*.
66 (63) Hind wings with two middle cellules.
67 (68) Eyes reaching to base of mandibles. *Eriocampa* in part.
68 (67) Eyes not reaching to base of mandibles. *Strongylogaster* in part.
69 (61) Lanceolate cellule with a short perpendicular nervure or shortly contracted.
70 (73) Posterior coxæ large, reaching to fourth abdominal segment.
71 (72) Antennæ setaceous, longer than abdomen, pleuræ broadly marked with white. *Pachyprotasis*.
72 (71) Antennæ short, thick, pleuræ seldom marked with white. *Macrophya*.
73 (70) Coxæ of normal size, not reaching to fourth abdominal segment.
74 (77) Antennæ shorter than the head and thorax, thickened at the apex, never filiform or setaceous.
75 (76) Eyes reaching to the base of the mandibles. *Allantus*.
76 (75) Eyes not reaching to the base of the mandibles. *Sciopteryx*.
77 (74) Antennæ longer than the head and thorax, filiform or setaceous, seldom fusiform.
78 (79) Blotch absent, stigma white and fuscous, or entirely white, scutellum and post-scutellum white. *Tenthredopsis*.
79 (78) Blotch distinct, stigma black or green; post-scutellum not white. *Tenthredo*.

80 (53) Antennæ multiarticulate, posterior tibiæ spined.
81 (82) Antennæ with not more than eighteen joints, dentate, posterior tibiæ with three spines. *Tarpa.*
82 (81) Antennæ with more than eighteen joints, filiform, posterior tibiæ with three spines. *Lyda.*
83 (20) Wings with three cubital cellules, antennæ 12-jointed, the third joint very long. *Pinicola.*

Tribe (sub-family).—TENTHREDINA.

Sub-tribes.

Tenthredinides.—Antennæ 9-jointed. Wings with two radial and four cubital cellules, the second and third receiving each a recurrent nervure. Lanceolate cellule subcontracted, or with a perpendicular, and more rarely with an oblique cross nervure. Basal nervure received at a distance from the cubital. Hind wings with two middle cellules. Mandibles acute, large, with two or three large teeth, besides the large apical one. Calcaria as long as half of the metatarsus. Larvæ ejecting a black or brownish liquid from the mouth.

Dolerides.—Antennæ 9-jointed. Wings with two radial and three cubital cellules, the second cubital the largest, and receiving two recurrent nervures. Basal nervure received at a distance from cubital. Lanceolate cellule with an oblique cross nervure. Hind wings with two median cellules.

Selandriades.—Antennæ 7- to 15-jointed. Wings with two radial and three or four cubital cellules. Lanceolate cellule petiolate or open, with an oblique cross nervure, or contracted. Basal nervure joined to the cubital. Hind wings rarely with two median cellules, often with one only or none. Spurs short. Mandibles weak, short, without distinct teeth on the sides.

Sub-tribe—TENTHREDINIDES.

The *Tenthredinides* have longish, narrow bodies, the abdomen being longer than the head and thorax, somewhat depressed above, and, as a rule, broadest in the middle. The antennæ are either long and filiform or short and subfusiform at the apex; in the latter case the third joint is much longer than the fourth. The head is much broader than long, concave behind, and to a less extent in front. The eyes are large and projecting, seldom reaching to the base of the mandibles. The clypeus is large, and generally deeply incised; labrum orbicular. Mandibles large, curved, and toothed. Legs long, coxæ of normal size, or so large as to reach the fourth abdominal segment. Spurs at least as long as half of the metatarsus, and generally longer than that. Hinder tarsi longer than the tibiæ. Patellæ very well developed; claws large, bifid.

Wings with two radial and four cubital cellules. Costal cellule distinct, with a cross nervure. Radial nervure curved, usually received towards the middle of the third cubital cellule. The second and third

cubital cellules receive each a recurrent nervure. The basal nervure is straight, and runs parallel with the first recurrent; it is always received in the costal cellule before the first cubital nervure, with which it never unites. Lanceolate cellule more or less subcontracted, or more usually with a straight, and more rarely an oblique cross nervure. The hind wings with two median cellules; the cubital and recurrent nervures are widely separated.

The larvæ have twenty-two legs. They are cylindrical, generally of uniform colour, or greenish above, and pale at the sides; or, more rarely, they may be ornamented with dots on the sides or along the back. Many change colour before pupating, which they do in the earth, in a cocoon or in a cell formed of earth. They are principally attached to herbaceous plants, comparatively few feeding on trees. As a rule they rest rolled up in a spiral, and when alarmed eject a brownish or blackish liquid from the mouth.

The most constant marks of distinction between this tribe and the *Selandriades* consist in the position of the basal nervure, in the spurs being always as long as half of the metatarsus, and in the more strongly-toothed mandibles.

The species of this sub-tribe are common in the Palæarctic and Nearctic regions, rarer in the Oriental, and would seem to be absent from Central and South America, as well as from the Australian region.

Synopsis of Genera.

A. Coxæ small.

***a*. Antennæ long, filiform, rarely fusiform.**

1. The third joint of antennæ considerably longer than the fourth; posterior wings with two median cellules in both sexes; blotch distinct. *Tenthredo*.

2. The third and fourth antennal joints sub-equal; blotch indistinct; posterior wing with the transverse cubital and recurrent nervures at edge of wing in ♂. Antennæ long, filiform.

Lanceolate cellule with a straight nervure. Two median cells in both sexes. Accessory nervure in posterior wing shortly appendiculated. *Tenthredopsis*.

Posterior wing with no median cellule in ♂, two in ♀. Lanceolate cellule contracted. *Synærema*.

_b_. Antennæ short, thickened. Accessory nervure at apex in posterior wing slightly appendiculated. Eyes converging; labrum rounded at apex. *Allantus*.

Eyes not converging, not placed near the base of mandibles. Apex of labrum incised. *Sciopteryx.*

B. Coxæ large, reaching to the apex of the third abdominal segment.

Antennæ long, filiform; thorax on the sides and breast more or less white. *Pachyprotasis.*

Antennæ short, thick; thorax rarely, and if so but slightly, marked with white. *Macrophya.*

Genus—TENTHREDO.

Tenthredo, Section 5, Htg., Blattw., 303.
Tenthredopsis, in part, Thoms., André.

Wings with two marginal and four submarginal cellules.

Lanceolate cellule subcontracted, or more usually with a straight cross nervure. Posterior wings with two median cellules in both sexes, the radial cellule not appendiculated.

Antennæ short, rarely longer than abdomen; filiform or setaceous, rarely thickened at the apex; bare, except the thick, ovate, basal joint, which is pilose, the third joint more than a third (generally) longer than the fourth.

Legs long, claws bifid; hinder trochanter reaching to the apex of the second abdominal segment. In some species the ♂ has the hinder tibiæ and tarsi thickened and flattened.

Head long, broad, somewhat cubital.

Clypeus deeply incised, rarely truncated at apex, the apical corners acutely pointed, sometimes projecting.

Labrum large, oval, or quadrangular at the apex.

Abdomen slightly depressed above, thickened in the middle at the sixth segment, sharply or bluntly rounded at the apex. Blotch distinct.

Scutellum generally raised, sometimes pyramidal, rarely flat. Mandibles long; the apical tooth long, curved; the second blunt, widely separated from first; the third generally split in the middle into two blunt projections. Labium with the two outer lobes broad, rounded externally, square above. Maxilla with the inner lobe bulging out roundly at the lower (exterior) side, narrowed into a sharp, curved, tooth-like projection at the apex; outer lobe bluntly ovate at apex, narrowed slightly at the sides.

In coloration the species belonging to this genus show considerable diversity. Generally they have mixtures of black and red, or black and yellow, with antennæ either entirely black or with the apical joints white or entirely yellow. Mixtures of green and black are also common, while some of the East-Indian forms are splendidly metallic, green, or blue. With most species the wings are hyaline, but these organs are sometimes yellowish, more rarely blackish or bluish.

The males, as a rule, do not differ much in coloration from the females. With some species, however, it is considerably lighter (*T. zonata*); parts which are quite black in the female being yellowish or red in the male. Some males have the legs lined with black (*T. atra*, &c.), others have the abdomen black, while it is banded with red in the other sex.

The geographical distribution of this genus is very wide. The species are very numerous in the Palæarctic, Oriental, and Nearctic regions, occurring in all their subregions. They are absent from the Neotropical, Australian, and Ethiopian regions.

The green species are temperate or northern forms, yellowish temperate or tropical, while the blue or green metallic species inhabits warm or tropical regions.

There are some sixty European species, and sixty-seven (including, probably, some pertaining to *Tenthredopsis*) are recorded from the United States and Canada by Cresson in his " Catalogue of the Tenthredinidæ and Uroceridæ of North America." (Trans. Am. Ent. Soc., viii, 1880.)

Obs.—It must be confessed that the differences between *Tenthredo*, as here defined, and the next genus, are not very great. The most certain distinctions consist in the deeply emarginated clypeus, the short, thick antennæ, having the third joint always considerably longer than the fourth, the mesonotum usually punctured, and the hinder wings having always two distinct middle cellules.

In *Tenthredopsis*, as here restricted, the species have the antennæ long, thin, filiform, with the third joint about the same length as the fourth; the cheeks are well developed, the eyes do not reach to the base of the mandibles; clypeus truncated, or if incised, only to a very slight extent, while we have the difference, although not a constant one, in the posterior wing of the ♂. We have, furthermore, a uniformity in the body form and coloration. The entire body is smooth, shining, the head and thorax bear white markings, while the blotch is invisible, a character which easily separates it from the other species placed in the genus by Thomson.

Thomson defines the three genera thus:

d. Genæ distinctæ; oculi nempe mandibularum basin haud attingentes.
  e. Alæ superiores cellula lanceolata breviter constricta. *Synærema.*
  ee. Alæ superiores cellula lanceolata nervo transverso brevi perpendiculari instructæ; inferiores cellula humerali breviter appendiculati. *Perineura.*
dd. Genæ nullæ; oculi nempe convergentes mandibularum basin attingentes. Alæ inferiores cellula humerali haud appendiculata. Mesonotum punctulatum. *Tenthredo.*

Besides "*instabilis*," Thomson includes in *Tenthredopsis T. viridis*, *punctulata*, *scalaris*, *gibbosa*, and *lateralis*.

I cannot accede to this arrangement. It seems to me that as thus constituted *Tenthredopsis* is a very artificial arrangement, and that the characters derived from the form of the cheeks and of the slightly appendiculated posterior wings can scarcely be regarded as of primary importance; indeed, the latter is a very inconstant character, occurring in very widely separated species. With *T. scalaris*, for example, the cellule is, with most of my specimens, scarcely appendiculated, and in two or three specimens it is completely interstitial. Similarly, the difference between "genæ nullæ" and genæ distinctæ" is merely comparative, and intermediate forms exist. Undoubtedly the *gibbosa* section forms a connecting link between the "instabilis" group and *Tenthredo* proper, but with the slight exceptions mentioned above, the species agree very well with *Tenthredo.* The green species placed in *Tenthredopsis* by Thomson have so many affinities with *olivacea*, *mesomela*, &c., that I do not see how they can be placed apart without violating many affinities. Besides, as thus constituted by Thomson, *Tenthredopsis* is a very heterogeneous genus, the two groups composing it—*instabilis* on the one hand,

and *viridis*, &c., on the other—differ in the form of the mouth, antennæ, and in the posterior wings in the ♂, while one section has the blotch, the other being without it. But, in point of fact, there does not appear to be any absolute distinction between the two groups, and they can only be retained apart as a matter of convenience.

Analytical table of Species.

1 (2) Antennæ entirely yellow. ***Flava.***
2 (14) Antennæ with the apical joints white.
3 (10) The fifth joint black, a double white mark over hinder coxæ.
4 (5) Scutellum white. ***Solitaria.***
5 (4) Scutellum black.
6 (7) Stigma distinctly white at the base. ***Livida.***
7 (6) Stigma not white at the base.
8 (9) Apex of abdomen black; tegulæ black. ***Coryli.***
9 (8) Apex of abdomen red; tegulæ red. ***Colon.***
10 (11) Third joint of antennæ white, a single spot over hinder coxæ. ***Velox.***
11 (10) Fifth joint white, no white spot over coxæ.
12 (13) Tegulæ white, pleuræ more or less rufous. ***Rufiventris.***
13 (12) Tegulæ and pleuræ black. ***Balteata.***
14 (31) Antennæ entirely black.
15 (18) Abdomen banded with red.
16 (17) Inner orbits of the eyes white; two spots over posterior coxæ. ***Lachlaniana.***
17 (16) Inner orbits of the eyes black; one spot over hinder coxæ. ***Moniliata.***
18 (15) Abdomen entirely black, legs red.
19 (24) Clypeus white, hinder legs for the greater part red.
20 (23) One or two marks over hinder coxæ; pronotum white.
21 (22) A single spot over hinder coxæ, legs red. ***Dispar.***
22 (21) A double spot over hinder coxæ, legs yellowish. ***Scotica.***
23 (20) No white mark over coxæ, pronotum black. ***Atra.***
24 (19) Clypeus black, posterior legs entirely black. ***Mandibularis.***
25 (28) Abdomen and legs yellowish.
26 (27) Scutellum, tegulæ, and hinder tarsi for the greater part yellow. ***Maculata.***
27 (26) Scutellum, tegulæ, and hinder tarsi for the greater part black. ***Bicincta.***
28 (25) Abdomen and legs green.
29 (30) Pleuræ and breast green. ***Mesomela.***
30 (29) Pleuræ and breast black. ***Obsoleta.***
31 (38) Antennæ green beneath, body and legs green.
32 (33) Cheeks indistinct, accessory nervure in posterior wings interstitial; hinder tarsi with the black continuous. ***Olivacea.***
33 (32) Cheeks distinct, accessory nervure appendiculated, tarsi annulated with black.
34 (37) Pleuræ without a black stripe, tarsi annulated with black.

35 (36) Vertex slightly, sutures of mesonotum, and a row of small black dots along the upper sides of abdomen black. *Punctulata.*
36 (35) Vertex, mesonotum, and back of abdomen broadly black. *Viridis.*
37 (34) Mesopleura with a black splash, transverse radial nervure interstitial, posterior tarsi entirely black. *Picta.*
38 (31) Antennæ testaceous beneath, abdomen with a reddish band.
39 (40) Sides of abdomen yellow; third cubital cellule short; legs entirely red. ♂ with the pleuræ white. *Lateralis.*
40 (39) Sides of abdomen not yellow; legs lined with black; third cubital cellule long. ♂ with the pleuræ black. *Gibbosa.*

SECTION 1.—*Mesonotum punctured. Humeral cellule in hind wing not appendiculated. Cheeks indistinct.*

Antennæ entirely and legs and body for the greater part yellow. Scutellum sharply peaked; pleuræ finely tuberculate. A white spot over posterior coxæ (Species 1).

1. TENTHREDO FLAVA.

Tenthredo flava, Scop., Ent. Car., 731; André, Species, i, 444, pl. xxi, fig. 2; Cat., 58,* 42.
— *poecilochroa*, Schr., En., 324, 654; Vill., Lin. Ent., 50.
— ***flavicornis***, Fab., E. S., ii, 113, 31; S. P., 31, 9; Fall., Acta, 1808, 61, 22; Klug, Berl. Mag., viii, 189, 132; Pz., F. G., lii, fig. 2; Rossi, F. E., 711; Vill., Lin. Ent., 73; Lep., Mon., 75, 224; Htg., Blattw., 311, 48; Evers., Bull. Mosc., xx, 54, 31; Thoms., Opus., 303; Hym. Scand., i, 271.
— ***luteicornis***, Fab., E. S., ii, 113, 32; S. P., 31, 10; Pz., F. G., lxiv, fig. 1 (var.); Evers., Bull. Mosc., xx, 54, 32.
Allantus flavicornis, Ste., Ill., vii, 64, 21.

Pale yellow; clypeus, labrum, mandibles, and a spot over the posterior coxæ, white; head, pleuræ, sternum, legs at the base and the four apical segments of the abdomen, black.

The ♂ similarly coloured, but with a black line over the posterior femora. Wings yellowish, infuscated at the apex.

Length 6½—7 lines.

Ab.—*a.* Thorax black above.

b. Posterior only, or the whole of the femora black (*luteicornis*).

According to Kaltenbach (Pfl., 269), the larva feeds in shady places during July and the beginning of August on *Aegopodium Podagraria*. It is bare, lemon-yellow to cinnamon-brown in colour, with numerous oblique lateral stripes proceeding down the sides from a central darker stripe on the back, there being one stripe on each segment; while before the last moult each segment bears two oblique rows of minute white tubercles. On the vertex is a dark brown longitudinal mark; an arched line goes also from the eyes in front, ending on the top in a trident, and behind each eye is an elliptical brownish ring.

A variable species in so far as the relative proportion of the yellow and black colour is concerned.

The only British specimens that I have seen recorded are those mentioned by Stephen's in his 'Illustrations.'

They are stated to have been taken near Plymouth.

The species on the Continent is tolerably common, and occurs in Scandinavia, Germany, Hungary, France, Switzerland, Italy, and Russia.

Antennæ long, compressed, a very little thickened at the apex—the apex of 6th, the 7th and 8th white—two white marks over posterior coxæ. Pronotum black. Abdomen black or red at apex or middle. Mesonotum and pleuræ opaque, punctured (Species 2—5).

2. TENTHREDO LIVIDA.

Tenthredo livida, Lin., F. Sv., 1557; S. N. ii, 925, 33; Fab., E. S., ii, 116, 46; Fab., S. P., 33, 21; Panz., F. G., 52, fig. 6; Schr., En., 326, 657; Klug Berl. Mag., viii, 183, 122; Lep., Mon., 83, 243; Htg., Blattw., 312, 55; Evers., Bull. Mosc., xx, 55, 37; Kalt., Pfl., 304 (lar.); Thoms., Hym. Scand., i, 275, 10; Cam., Fauna, 11, 1; André, Species, i, 448; Cat., 56,* 25.

— *carpini*, Panz., F. G., 71, fig. 19.

— *albicornis*, Fourc., E. P., 22; Geof., H. J., ii, 282, 22.

— *maura*, Fab., E. S., ii, 116, 44; S. P., 19; Lep., F. Fr., pl. 3, fig. 7; Mon., 79, 235; Fall., Acta Holm., 1808, 55, 11.

Tenthredo annularis, Schr., En., 325, 655; Vill., Lin. Ent., 51.
? — *bipunctata*, Kl., Berl. Mag., viii, 124; Htg., Blattw., 312, 53.
Allantus lividus, Ste., Ill., vii, 66, 28.
— *aterrimus*, Ste., l. c., 66, 27.
— *bipunctatus*, Ste, l. c., 67, 31.

Black; apex of sixth joint of antennæ, the seventh, eighth, and base of ninth, clypeus, labrum, mandibles, two spots over posterior coxæ, white; apex of mandibles piceous; palpi white, pilose; mesonotum opaque, punctured. Legs: coxæ, trochanters, and femora more or less, apex of tibiæ and posterior tarsi more or less black; part of femora, tibiæ almost wholly, and apex of tarsi, livid red; anterior knees, tibiæ, and tarsi livid white in front. Pleuræ finely punctured. Abdomen black, the middle and apex frequently red. Wings hyaline, costa and stigma fuscous, the latter livid white at the base (having a greenish tinge when fresh); tegulæ black. Sheath of saw largely projecting, reddish in the middle.

The ♂ has the abdomen entirely reddish-testaceous beneath, and for the greater part above; the anterior legs are livid white in front, the rest red, more or less lined with black above.

Length 5—6 lines.

From the succeeding species *livida* is distinguished by the colour of the stigma, longer antennæ, more pubescent mesonotum and pleuræ, and more pilose head; the legs are more marked with black, and of a livid, not clear red; the red on the abdomen is paler, less distinctly and more irregularly spread over the segments.

In coloration it varies exceedingly; the white on the antennæ is irregularly distributed over the apical joints; the legs and abdomen are very often quite black (this *ab.* being I believe the *bipunctata* of Klug), fuscous black, or pitchy. Generally the apex (the three apical segments) is red; but sometimes it is black, pitchy, or testaceous. The legs have usually the coxæ, trochanters, the whole of posterior femora, the two anterior femora at the base, the apex of posterior tibiæ and tarsi black, but occasionally they show red, and in rarer cases are quite black. The wings have sometimes a fuscous tinge.

The larva, according to Kaltenbach, feeds during September and October on *Lonicera racemosa* and *xylosteum*. It is one inch long, bare, pale yellow, mottled with black, and with an orange-coloured head. It pupates in the earth.

The flies are very common in June and early in July, appearing often on the flowers of the rasp. It is found everywhere in abundance in Scotland, but does not seem to be equally common in England, although generally distributed there.

On the Continent it occurs in Scandinavia, Germany, Hungary, Holland, France, Italy and Russia to the Ural Mountains.

3. TENTHREDO CORYLI.

Tenthredo coryli, Panz., F. G., lxxi, fig. 8; Fab., S. P., 34, 22;
Klug, Berl. Mag., viii, 182, 120;
Lep., Mon., 78, 230; Htg., Blattw., 313, 57; Von Siebold, S. E. Z., 1845, 325; André, Species, i, 446; Cat. 57,* 30.
? *biguttata*, Htg., Blattw., 313, 58.

Black; four apical segments of the antennæ more or less, two large spots above posterior coxæ, clypeus, labrum, base of mandibles and palpi, clear white; the three middle segments of abdomen testaceous-red. Legs pale red, coxæ, trochanters, posterior femora, the anterior more or less, at the base and the joints of posterior tarsi annulated with black; anterior femora at the apex, tibiæ and tarsi livid white. Mesonotum and pleuræ punctured, opaque. Wings hyaline, costa and stigma pale fuscous.

The ♂ has the breast whitish-yellow the abdomen whitish yellow beneath, with the first, second, eighth and ninth, and the base of the others above black (*teste* André).

Length 5—5¾ lines.

The amount of black on the legs and the intensity of the red colour on the legs and abdomen vary.

Easily known by the short, rather thick antennæ, the ninth joint of which is white throughout, and by the red band on the middle of the abdomen.

Apparently a rare insect; Stephens records it from the London district. It does not occur in Scotland.

Germany, France, Holland, Switzerland, Hungary, Russia are the continental countries from which it has been recorded, and it is rare everywhere.

4. TENTHREDO COLON.

Pl. 1, fig. 9, larva.

Tenthredo colon, Klug, Berl. Mag., viii, 182, 121; Htg., Blattw., 312, 56; Evers., Bull. Mosc., xx, 55, 38; Thoms., Hym. Scand., i, 276, 12; Kalt., Pfl. 251; Voll., Tidj. Ent., xviii, 43—49, pl. 5 (lar. &c.); Cam., Fauna, 11, 2; André, Species, i, 445; Cat., 57,* 27.

Allantus colon, Ste., Ill., vii, 67, 29.

Black, shining; sixth, seventh, eighth, and the greater part of the ninth joint of antennæ, mouth, and two spots over posterior coxæ white. Legs reddish, coxæ, trochanters, and the posterior femora sometimes black at the base and apex, posterior tarsi annulated with black, anterior legs pale white in front. Abdomen black, red at the apex (generally the three apical segments). Wings hyaline, costa pale fuscous, stigma blackish-fuscous, tegulæ red.

The ♂ has the seven apical abdominal segments red, all the femora lined above with black, and the coxæ below, trochanters, and extreme base of femora whitish. In the only ♂ I have the two apical joints of the antennæ are white.

Length 4½—5 lines.

Among other differences *colon* may be known from *livida* by the shorter, less excavated front, the antennal joints are not so much produced at the apex, the sixth being moreover quite white, and the tegulæ are reddish. Compared with *coryli* it has the antennæ longer, and black at the extreme apex; the front is more excavated, and the head more shining.

It is rather a variable species. The legs are sometimes quite red, with the base of the coxæ and trochanters white; or the latter may be black, and a shorter or longer black line over the femora; the tegulæ vary from clear red to fuscous, and the number of abdominal segments that may be red varies; occasionally, too, specimens are met with having the anal segment blackish.

The larva has been described by Kaltenbach, and by Vollenhoven, who has given good figures of the larva and imago.

According to these observers the larva feeds during

September and October on *Circæa lutetiana* and on the fuchsia. It feeds generally in the evening, devouring the leaves, flower and fruit. The head is honey-yellow, shortly and thinly pubescent, with a black spot on the vertex, this spot being generally divided in two. The body is pale brownish-yellow, marked above with darker brown lines, proceeding from the centre of the back to the sides in the direction of the tail, there being also a dorsal line of the same colour. The sides and legs are dirty white. On the second segment is, on each side, a blackish mark. The whole body is covered with numerous pointed, clear tubercles, each ending in a hair. The cocoon is spun in the earth, the imago making its appearance in May and June.

It does not seem to be a common species in Britain. Dr. Sharp has taken it in Scotland, at Thornhill, and Stephens records it from the London district.

Its European distribution is wide, being found in Sweden, Germany, Holland, Italy, Hungary, and Russia (Casan district).

5. TENTHREDO SOLITARIA.

Tenthredo solitaria, Scop., Ent. Car., 281, 738 (1763). ♂.
— — Schr., En., 326, 658 (1781) (in part); Vill., Lin., Ent., 51.
— *fagi*, Pz., F. G., lii, fig. 14; Klug, Berl. Mag., viii, 186, 126; Htg., 312, 52; Evers., Bull. Mosc., xx, 55, 36; Thoms., Hym. Scand., i, 276, 11.
— *pellucida*, Klug, l. c., 187, 127, ♂; Htg., l. c., 311, 51.
— *maura*, André, Species, i, 462; Cat., 56,* 24.
Allantus solitarius, Ste., Ill., vii, 66, 26.

Black, shining; clypeus, labrum, mandibles, the sixth (except at extreme base), seventh, and eighth apical joints of antennæ, scutellum and two large spots over posterior coxæ, white. Legs: trochanter pale, posterior femora almost wholly black, middle black above, pitchy beneath, anterior black behind, whitish in front; anterior tibiæ white in front with a black line behind, middle black, for the greater part pitchy-testaceous in front, posterior pair reddish between, except at the apex, which is black; anterior tarsi testaceous, whitish in front, posterior black. Wings hyaline, costa and stigma fuscous, the latter

being darker in the middle. Vertex, shining, pubescent; pleuræ and mesonotum almost opaque.

The ♂ has the four middle segments of the abdomen livid testaceous, white in the middle above and beneath, and the anterior legs are of a clearer white in front, while the posterior tibiæ are lined with black behind; there is only one white spot over posterior coxæ, and the wings are a little clouded at the apex.

Length 6½—7 lines.

The nearest ally of *solitaria* is perhaps *T. albicornis*, F. (not a British species), but the latter is readily known from it by having the three apical joints of antennæ entirely white, the fourth being black, the clypeus and labrum are black and the mandibles white, the scutellum black, while the tibiæ and tarsi are testaceous. The ♂ of *albicornis* has a distinct appendicular cellule in the posterior wing.

T. solitaria seems to be confined to the southern counties in England, and is not uncommon in June (on flowers according to Stephens) in the London districts, Kent, Surrey, &c. It has a wide European distribution, being found in Scandinavia, Holland, Germany, France, Switzerland, Italy, and Russia, to the Ural range.

Antennæ short, third joint in part, and the succeeding joints entirely underneath, and the apical altogether white. A single spot over posterior coxæ. Pronotum, tegulæ, and abdomen black. Legs reddish, black above. Mesonotum and pleuræ opaque, finely punctured. Stigma black (Species 6).

6. TENTHREDO VELOX.

Plate VIII, fig. 6, ♂.

***Tenthredo velox*, Fab., S. P., 34, 24; Klug, Berl. Mag., viii, 185, 123; Lep., Mon., 111, 323; Htg., Blattw., 312, 54; Cam., Fauna, II, 3; E. M. M., xvi, 248; André, Species, i, 449; Cat., 56,* 23.**
— — ab. *Nigro-lineata*, Cam., Sc. Nat., iv, 11.
***Allantus* — Ste., Ill., vii, 68, 32.**

Black; clypeus, labrum, and base of mandibles, a single spot over posterior coxæ, apex of the third, fourth, fifth, and sixth beneath, and seventh, eighth, and ninth (except at extreme apex) entirely white. Legs red, coxæ and trochanters and base of femora, apex of posterior

tibiæ and tarsi, the anterior tibiæ behind, and the joints of the tarsi in part black; anterior tibiæ and tarsi livid white in front. Wings short, hyaline; costa and stigma black. Vertex and abdomen shining; mesonotum opaque, punctured; vertex finely punctured, shortly pilose. Mandibles brownish at apex.

The ♂ has the abdomen from the third segment red; the whole of the femora and the four anterior tibiæ and tarsi are broadly lined with black above. The antennæ have all the apical joints black on the upper side.

Length 4½—5 lines.

Ab.—*Nigro-lineata*, Cam. All the femora and the four anterior tibiæ and tarsi broadly lined on the upper surface with black. ♀ and ♂.

The amount of black on the legs and of white on the antennæ varies a good deal.

The black body, reddish legs, and single white spot over the posterior coxæ, will serve to distinguish this species, which is tolerably common in Scotland, from the south to Sutherlandshire, but seems not to be so common in England, where, according to Stephens, it has been taken in Birch Wood.

The species does not apparently inhabit Scandinavia, but is met with in Germany, Holland, Switzerland, and Italy.

Antennæ short, fifth, sixth, and seventh joints more or less white. Eyes and pronotum marked with white. No white mark over posterior coxæ. Pleuræ finely tuberculated, pilose. Eyes small, not touching clypeus. Legs red, femora lined with black. Abdomen shining, bronzy, mostly reddish (Species 7 and 8).

7. TENTHREDO RUFIVENTRIS.

Tenthredo rufiventris, Pz., F. G., 65, fi. 5; Fab., Ent. S., ii, 116, 45; S. P., 33, 20; Fall., Acta Holm., 56, 12; Klug, Berl. Mag., viii, 180, 118; Lep., F. Fr., pl. 4, fig. 3; Mon., 86, 245; Htg., Blattw., 313, 60; Thoms., Hym. Scand., i, 277, 15; Cam., Fauna, 11, 5; André, Species, i, 456; Cat., 56,* 22.

— *rufipennis*, Fab., S. E., ii, 116, 45.

— *conspicua*, Kl., Berl. Mag., viii, 180, 117; Htg., Blattw., 313, 61; André, Species, i, 461; Cat., 56,* 21.

Allantus rufiventris, Ste., Ill., vii, 65, 23.
— *conspicuus*, Ste., l. c., 65, 24.
— *laticinctus*, Ste., l. c., 65, 22.

Black; face, mouth, inner orbits of the eyes, tegulæ, a line on the pronotum, fifth apical joint of the antennæ partly, sixth and seventh wholly white; the two apical joints fuscous; pleuræ, breast, abdomen for the most part and legs reddish; posterior coxæ, four posterior femora above, and anterior slightly at the base, black. Front strongly punctured, brassy, shining, slightly pubescent; mesonotum opaque, slightly punctured; pleuræ strongly and roughly punctured; breast covered with a very short pile. Abdomen shining, smooth, brassy.

The basal segment of the abdomen is always black, but the succeeding segments vary in the intensity and amount of red which they bear; the pleuræ are sometimes quite red, often there is only a faint splash of that colour, the same being the case with the sternum; the white on the antennæ varies in clearness, and the colour on the face varies from white to reddish-white. The coloration of the coxæ and of the other parts of the legs varies also. The wings are almost hyaline, but with a faint brownish tinge; stigma pale testaceous. ♀ and ♂.

Length 5½—6 lines.

This is a larger species than *balteata*. The tegulæ are white, the head and breast not so densely pubescent, and more deeply punctured; the pleuræ are splashed with red; the two last joints of antennæ are fuscous, the stigma pale testaceous, and the abdomen redder and with a more bronzy tinge.

The aberration with only the two basal segments of the abdomen black is the *T. conspicua*, Kl. The ♂ is rare compared to the other sex.

A tolerably common species, appearing in woods during the latter part of June and in July. I have taken it in the Glasgow districts, in Perthshire, Invernessshire, Ross-shire, and Sutherlandshire; have seen specimens from Braemar, Berwickshire, and Dumfriesshire, also from Newcastle (Bold), Norwich (Bridgman), London districts, Dorsetshire, Devonshire (Parfitt), Gloucester, and Worcester.

On the Continent it occurs in Scandinavia, Germany, Holland, France, and Italy.

8. TENTHREDO BALTEATA.

Tenthredo balteata, Klug, Berl. Mag., viii, 181, 119; Htg., Blattw., 313, 59; Thoms., Hym. Scand., i, 277, 14; Cam., Fauna, 11, 4; Brischke, Ent. Nacht., 1880, 56; André, Species, i, 447; Cat., 57,* 29.
— *soror*, Zett., I. L.
Allantus balteatus, Ste., Ill., vii, 66, 25.

Black; face with the inner orbits of the eyes, apex of fourth, the fifth to ninth antennal joints beneath, and edge of pronotum white; abdomen beneath, and the second to the seventh and eighth above, with the legs reddish. Femora lined with black above, cenchri large, distinct; tegulæ black. Wings hyaline; costa and stigma pale fuscous, the latter darkest. The vertex and mesonotum are opaque, punctured; vertex covered with a short grey pile, pleuræ slightly and breast densely pubescent; the face is sparsely covered with long hairs.

The ♂ has the tegulæ white, the tibiæ narrowly lined with black above, the coxæ and trochanters black only at extreme base and apex, and the third joint at the apex and the whole of the fourth antennal joint are white on the under side.

Length 5—5½ lines.

The white on the face is often spotted with black dots, and the red on the abdomen is frequently very obscure. The larva, according to Brischke, feeds on the bracken (*Pteris aquilina*).

One of the commonest species of the genus. It appears in June and early in July, and abounds from Devonshire to Thurso. Its continental distribution is co-extensive with that of *rufiventris*.

Antennæ black, moderately long. Eyes converging. Mouth white. Pronotum black, or lined with white; sometimes a white mark over posterior coxæ. Abdomen entirely black, or with the middle segments red. Legs red, the posterior marked with black. Posterior tarsi compressed and thickened (Species 9 to 14).

9. TENTHREDO LACHLANIANA.

Pl. VIII, fig. 1, ♀; 1*a*, antennæ; 1*b*, head.

Tenthredo lachlaniana, Cam., Fauna, 12, 6; André, Species, i, 453; Cat., 56,* 16.

Black; mandibles, clypeus, labrum, inner orbits of the eyes; a triangular spot between the antennæ; tegulæ, edge of the pronotum, and two spots over the posterior coxæ, whitish-yellow; third, fourth, and fifth abdominal segments red, as are also the apices of the four anterior femora, and the tibiæ and tarsi. The thorax is opaque, head and abdomen shining. Wings hyaline; costa and stigma pale fuscous.

What I regard as the ♂ has the antennæ longer, the colour of the face is the same, only the white is wider round the eyes. The legs are red, same a black line over the femora, and the coxæ in part behind. The breast is reddish, and there are two yellow streaks on the pleuræ; the first going from near the tegulæ to the middle coxæ, the second is short and more curved in form, and nearly joins the first at its lower end. The scutellum has two small yellow marks behind, and the abdomen is entirely red beneath, black on part of the first and the two last segments.

Length 5—6 lines.

This species is no doubt confounded with *moniliata*, from which, however, it may be readily known by having the inner orbits of the eyes and the posterior femora quite black; the markings on the head, thorax, and abdomen are white, not yellow, and the posterior tarsi and apex of tibiæ are not marked with black. In *moniliata*, too, the tegulæ are reddish, in the present species white, which has also two marks over posterior coxæ instead of one as in Klug's insect.

In one of my Scotch specimens the red abdominal band is very obscure, and two others have only one side of the pronotum white.

Three specimens were taken by myself at Rannoch, in June, and another by Dr. Sharp at Braemar; the ♂ I took near Gloucester. I have also seen a German specimen taken by Prof. Zeller, and André records it from Finland and Switzerland.

10. TENTHREDO MONILIATA.

Tenthredo moniliata, Klug, Berl. Mag., viii, 205, 153; Htg., Blattw., 306, 27; Evers., Bull. Mosc., xx, 47, 15; Thoms., Hym. Scand., i, 275, 9; André, Species, i, 458; Cat., 55,* 10.

Black; clypeus, labrum, palpi, mandibles, a line on pronotum and a mark over the posterior coxæ yellowish-white, the three or four middle segments of the abdomen and legs red; the coxæ, trochanters, posterior femora above, the apex of posterior tibiæ and the greater part of posterior tarsi, black; tegulæ reddish, or reddish-white. Wings hyaline, costa and stigma fuscous. Abdomen long, cylindrical, a third longer than head and thorax. ♀.

Length 6—6¼ lines.

This species shows considerable variation in the size of the abdominal ring as well as in the quantity of black on the femora. *T. plebeja*, Kl., differs from *moniliata* in having the legs entirely reddish. As it has red tegulæ I suspect it is only a variety of the latter. *T. trabeata*, Kl., is readily known by having the three middle abdominal segments red above and yellow at the sides, while the anterior tibiæ are white in front and the hinder pair wholly white, except a narrow ring at base and apex. The femora are, for the greater part, black.

Thomson describes the ♂ of *moniliata* as being similar to the ♀, but this is, I think, doubtful. I believe the ♂ of *moniliata* is *T. poecila* (Klug), Evers., Bull. Mosc. xx, 48, 17. Eversmann describes *moniliata*, ♀, and *poecila* differs from it and agrees with the ♂ of *lachlaniana* exactly in the same points in which *moniliata* ♀ agrees with and differs from *lachlaniana* ♀; that is to say, there is only one spot over the hind coxæ, and the mouth only is white. Otherwise *poecila* differs from *lachlaniana* ♂ in having only the front femora lined with black, and there is only one yellow line on the pleuræ.

Seemingly rare. Taken by Mr. McLachlan at Aberlady in June.

Continental distribution: Tyrol, Germany, Sweden, Russia.

11. TENTHREDO DISPAR.

Pl. XVI, fig. 1, Saw.

Tenthredo dispar, Klug, Berl. Mag., viii, 206, 154; Htg., Blattw., 306, 27; Evers., Bull. Mosc., xx, 13, 47; Cam., P. N. H. S., Glas., iii, 89 (la.); E. M. M., xiii, 198; Cam., Fauna, 12, 8; André, Species, i, 454; Cat., 55,* 8.
— *atra*, Thoms., Hym. Scand., i, 274, 1 (in part).
Allantus dispar, Ste., Ill., vii, 68, 34.

Black; clypeus, labrum, mandibles, a line on the pronotum, and a spot over the posterior coxæ white; legs red; coxæ, sometimes the trochanters, apical third of posterior tibiæ and tarsi black. Tegulæ reddish, frequently black; palpi pale testaceous. Antennæ scarcely the length of abdomen, middle joints not thicker than the third and fourth, the apical thinner. Head densely covered with short hair; mesonotum and pleuræ opaque, alutaceous. Head and abdomen shining. Wings hyaline, apical half of costa testaceous; stigma black.

The ♂ has the white band on pronotum broader, there is a white line below the eye; the 2—5 abdominal segments are reddish, femora banded with black above, and the posterior tibiæ have only the basal third reddish.

Length 5—5½ lines.

There is sometimes a pale streak in front of anterior legs; the trochanters and base of femora are often more or less black, and posterior tibiæ nearly all black; pronotum devoid of white, and the tegulæ vary from red (the normal colour) to black, while there may be one or two marks over the posterior coxæ.

The larva I have found in July and August feeding on *Scabiosa succisa*. It has the head black, except the face, which, with the sides, is green; the eye spots black, or rather they are placed in the black coloured part of the head. The body is dark green, the folds of the skin being marked with black, and across the back there are darker green stripes proceeding from the edges to the centre, but still remaining apart; below the spiracles the sides are of a lighter green colour, and the legs are similarly coloured. Across the skin there are whitish raised dots—there being two rows of these to each segment—and on the head are a few scattered hairs. Length 13—14 lines.

When alarmed or touched in any way, it rolls itself up into a ball, and ejects a brownish liquid from the mouth. When full fed it becomes of a glassy light green colour, and pupates in the earth without spinning a cocoon (at any rate in my breeding box). It simply formed a hole neatly smoothed on the inner side in the earth.

Dispar I find everywhere in Scotland. The only English locality I know is that mentioned by Stephens, Darenth Wood, where it is said to be common. On the Continent it is found in Scandinavia, Germany, France, Switzerland, Hungary, and Russia.

12. TENTHREDO SCOTICA.

Pl. XVI, fig. 2, Saw.

Tenthredo scotica, Cam., E. M. M., xviii, 193 (1882).

Black; clypeus, labrum, a line round the lower part of the eyes, one on the pronotum, two spots over the posterior coxæ, the apical three-fourths of the under side of the front coxæ, and an irregular spot on the apex of the two hinder ones, white. Legs with the coxæ for the greater part black, the rest pale yellow save the extreme apex of the hinder tibiæ and the tarsi, which are dull fuscous. Wings almost hyaline, costa dull red; stigma black. ♀.

Length 5¾ lines.

Similar to *dispar* in size and form, but having (apparently) the antennæ and metatarsus shorter, the head more opaque and punctured, and otherwise differing in the colour of the face and legs. The saw also differs. Rare, taken near Dumfries in June,

13. Tenthredo atra.

Pl. VIII, fig. 5. Pl. XVI, fig. 3, Saw.

Tenthredo atra, Lin., F. Sv., 1554; S. N., ed. xii, 924, 26; Geof., Ins., ii, 283, 24; Pz., F. G., 52, t. 7, 65, t. 7; Fab., E. S., ii, 117, 49; S. P., 34, 26; Lep., Mon., 80, 237; Spin., Ins. Lig., i, 57; Klug, Berl. Mag., viii, 207, 155; Lep., Mon., 80, 237; Htg., Blattw., 306, 25; Evers., Bull. Mosc., xx, 47, 12; Thoms., Opus., 303, 4; Hym. Scand., i, 274, 7 (in part); André, Species, i, 440; Cat., 55,* 2.
— *fuscipes*, Gmel., S. N., v, 2667.
Allantus ater, Ste., Ill., vii, 68, 33.

Black; mouth white, legs reddish, apex of posterior tibiæ and tarsi black. Wings hyaline, apex of costa reddish; stigma black; tegulæ reddish.

The ♂ has abdomen—generally 2—5 segments—broadly red, and the femora lined with black.

Length 5—6 lines.

Atra bears a very considerable resemblance to *dispar* from the darker varieties of which it is not always easy to separate. Generally it may be distinguished from *dispar* by the absence of white on the pronotum and over the posterior coxæ, the wider, if not so deep, incision in the clypeus, and the apex of the posterior tibiæ not being so largely marked with black. The ♂ has only the posterior femora lined with black, while that of *dispar* has the tibiæ also marked with black.

The imago is stated by Rudow (Stett., Ent. Zeit., xxxii, 386) to lay its eggs in the thick midrib of the leaves of the alder, and Dours (Cat. Syn., 23) says that the larva lives on the gooseberry and willow, but this is probably merely a conjecture on his part.

It is stated also by André to feed on the alder during July and August. He describes it as having the body obscure green marked with black in the folds of the skin, and there are also two rows of whitish tubercles on each segment; the back is marked with splashes of a more obscure green, the sides and the lower part are of a clearer green; the head is black, with the face and sides green. At the last moult the whole body becomes of a pale vitreous green. As usual it pupates in the earth.

Atra does not seem to be very common. I have three Scotch examples, one from Rannoch, one from Braemar, and another from Altnaharra, Sutherlandshire. In England it occurs at Worcester, Devonshire, and Stephens mentions Darenth and Coombe Woods as habitats, while I have a specimen from the South of Ireland.

Its continental distribution is very general, being found in Scandinavia, Germany, Holland, France, Switzerland, Italy, and Russia.

Obs.—There are certain species related to *atra* not yet found in Britain which may be here mentioned, the more especially as some of them are perhaps only varieties of *atra* or *dispar*. *T. procera*, Kl., is a good species. It has the same coloration as *dispar*, that is to say, with white, or rather red, on pronotum and over posterior coxæ; but it may be at once distinguished by its greater size, longer wings, and much longer and thinner antennæ. *T. rufipes*, Kl., is probably only a variety of *dispar*, with the posterior tibiæ and tarsi reddish. *T. caligator* (Klug), Evers. (Bull. Mosc., xx, 47, 14), appears only to differ from *atra* in its larger size, about a line over the normal size of *atra*.

It may be added that all the forms have frequently the mouth spotted with brown or black, while the amount of black on the base of the legs and tarsi and tibiæ varies a good deal.

14. TENTHREDO MANDIBULARIS.

Tenthredo mandibularis, Pz., F. G., xcviii, fig. 9; Fab., S. P., 34, 27; Klug, Berl. Mag., viii, 208, 158; Lep., Mon., 112, 325; Htg., Blattw., 305, 22; André, Species, i, 440; Cat., 55,* 3.
Allantus mandibularis, Ste., Ill., vii, 69, 35.

Black; mandibles, and a spot over the posterior coxæ white; four anterior legs red, except at base; half shining, pleuræ opaque, distinctly punctured; antennæ longer than the abdomen, the middle joints thickened. Wings hyaline, very slightly suffused with yellow; costa pale reddish; stigma black. Posterior spurs pale. ♀ and ♂.

Length 6 lines.

Easily known from all the other species of the genus by the longish antennæ, thickened in the middle, and by the black posterior legs and mouth.

It is not a common species, and appears to be confined to the southern countries. Stephens records it from Darenth Wood, and Mr. C. W. Dale tells me that he has it from the New Forest.

It is found in Germany, Sweden (according to Dahlbom, but Thomson does not mention it), Denmark, France, and Switzerland.

Antennæ black, the sixth, seventh, and eighth joints thickened. Mouth, abdomen, and legs marked with yellow. Mesonotum shining; scutellum raised, oval; pleuræ half shining, finely punctured in the middle, pilose. Abdomen cylindrical. Clypeus not very deeply incised. (Species 15 and 16).

15. TENTHREDO MACULATA.

Pl. VIII, fig. 2, ♂ ; 2 *a*, claws; 2 *b*, face.

Tenthredo maculata, Fourc., E. P., ii, 6; André, Species, i, 459, Cat., 57,* 36.
— *zonata*, Pz., F. G., lxiv, fig. 2; Lep., Mon., 74, 222; Klug, Berl. Mag., viii, 133; Htg., Blattw, 310, 47; Evers., Bull. Mosc., xx, 53, 30; Cam., Fauna, 13, 10.
— *cincta*, Schaef, Icon., 56, fig. 2.
— *equestris*, Pz., F. G., cvii, fig. 6.
— *succincta*, Don., B. E., xiii, 17, pl. 441, fig. 2.
— *latizona*, Lep., F. Fr., pl. 3, fig. 4; Mon., 74, 223.
— *unifasciata*, Fourc., E. P., ii, 7.
Allantus zonatus, Ste., Ill., vii, 64, 20.

Black; shining, somewhat pilose, clypeus, labrum, mandibles, palpi, edge of pronotum, tegulæ and scutellum, yellow. Legs yellow; coxæ, femora, and apices of the tibiæ and basal joint of the posterior tarsi black. Abdomen black, fourth, fifth, and the ninth segment at its apex, pale yellow. Wings hyaline, faintly clouded at the apex, costa and stigma black.

The ♂ is pale yellow, with the head (except the mouth), meso- (except scutellum) and metathorax, a mark over the basal abdominal segment, the apical abdominal segments, and a line over the femora, tibiæ, and tarsi black, the black on the anterior femora being only over the apical third and that on the middle pair on the apical half. The line over the tarsi is somewhat interrupted. The tarsi are covered on underside with close, thickly-pressed hair.

Length 6—7 lines.

This insect is known from *bicincta* by its much larger size, yellow scutellum, anal segment having only a very small patch of yellow, the yellow posterior tarsi, there being only a black band on the apex of the metatarsus; the clypeus is not so deeply notched, patellæ are much more strongly developed, antennæ are longer in proportion, and not so much thickened at the apex, and the pubescence on the head is much longer and thicker.

The coloration in the ♀ is tolerably constant, but in the ♂ it varies considerably, especially on the thorax and legs; in some individuals only the sternum is black, while in others the pleuræ are more or less of that colour; so also the femora may be either quite black or with only a slight irregular black line, and the abdomen may be entirely yellow or with a black patch at the base and apex. The tibiæ, too, vary in the same way as the femora.

Maculata does not seem to be a very common insect. I have taken it on oak near Glasgow; it is met with in Darenth Wood, and some other metropolitan situations, also in Devonshire. It is found towards the end of June and beginning of July.

Nothing definite is known about the larva, although Dours (Cat. Syn., 24) says that it feeds on the oak.

It occurs in Germany, Hungary, France, Switzerland, Italy, and Russia.

16. TENTHREDO BICINCTA.

Tenthredo bicincta, Lin., S. N., 9, 25, 31; Fallen, Acta Holm., 1808, 52, 8; Klug, Berl. Mag., viii, 191, 134; Htg., 310, 46; Evers., Bull. Mosc., xx, 53, 29; Thoms., Opus, 303, 2; Hym. Scand., i, 272, 2; Cam., Fauna, 13, 11; André, Species, i, 442; Cat., 57,* 37.
— *cincta*, Pz., F. G., lxiv, fig. 2; Fab., S. P., 29, 3; Lep., F. Fr., pl. 5, fig. 3; Mon., 91, 263.
— *vaga*, Fab., S. P., 37, 41.
— *semicincta*, Schr., En., 331, 665.
Allantus cinctus, Ste., Ill., vii, 64, 19.

Black; pilose, clypeus, labrum, base of mandibles, second, third at the side above, and the three apical abdominal segments more or less above, yellow. Legs yellow, base of coxæ, femora, apical third of posterior tibiæ and the tarsi black. Wings hyaline, clouded at the extreme apex, costa and stigma black. Pleuræ opaque, pilose, front smooth, shining.

The ♂ has the body beneath and the sides yellow, so also are the coxæ and the legs underneath; the hinder tibiæ are black throughout above.

Length 5—5¾ lines.

The antennæ have the five apical joints distinctly thickened and shaped not unlike those of *Allantus*. The four anterior legs have generally the coxæ and trochanters black, and the femora have a yellow line; but it is rather a variable species in this respect.

Possibly its nearest ally is *T. trabeata*, Kl. (which is not British), which differs from it in having a broad reddish band, white at the sides, on the middle of the abdomen, the tegulæ and a line on the pronotum yellow; the antennæ are not thickened at the apex, while the four anterior tibiæ and tarsi have a black line behind, and the posterior tarsi are only annulated with black.

Bicincta is not uncommon in woods (frequenting flowers, according to Stephens) at the end of May, in June, and beginning of July. It is found near Glasgow, in Berwickshire, Newcastle, Manchester, Worcester, Gloucester, Devonshire, Glanvilles' Wootton, in the metropolitan neighbourhood, at Dover and Norfolk.

It is extensively spread over Europe, inhabiting Scandinavia, Denmark, Germany, Hungary, Holland, France, Switzerland, Tyrol, and Russia.

Body for the greater part black above, green at the sides and beneath; legs lined with black above. Antennæ short, black, thickened at apex. Clypeus slightly emarginated. Stigma black. Mesonotum opaque, strongly punctured. (Species 17 and 18).

17. TENTHREDO MESOMELA.

Tenthredo mesomela, Lin., F. S., 1549 ♂ ; Fall., Acta, 1808, 98, 28 ; Thoms., Hym. Scand., i, 272, 4 ; Cam., P. N. H. S., Glas., iii, 90 ; E. M. M., xii, 199 (lar.) ; Fauna, 13, 13 ; André, Species, i, 460 ; Cat., 58,* 48.
— *viridis*, Klug, Berl. Mag., viii, 191, 135 (*nec viridis*, Lin.) ; Htg., 310, 45 ; Evers., Bull. Mosc., xx, 52, 28.
— *interrupta*, Lep., Mon., 86, 249, F. Fr., pl. 4, fig. 5.
— *hebraica*, Fourc., E. P., ii, 363.
— *marginata*, Christ., Hym., 438.
— *scalaris*, Thoms., Opus., 303, 3.
Allantus viridis, Ste., Ill., vii, 69, 37.

Antennæ black, shorter than the abdomen ; basal joint nearly three times the length of the second ; fifth, sixth, and seventh slightly thickened ; ninth oblong, thinner and shorter than the eighth. Head black, shining, finely punctured, covered with a longish pale down ; face from below the antennal fovea, as well as the lower parts of the orbits of the eyes, greenish-white ; mandibles blackish, palpi greenish ; antennal fovea deep, oblong ; clypeus roundly emarginated. Mesonotum black, opaque, deeply punctured ; tegulæ, pronotum, pleuræ, sternum, scutellum, post-scutellum, and a spot behind, greenish-white ; pleuræ marked with a black oblique line ; pleural sutures black ; scutellum smooth, shining, raised ; cenchri small. Legs greenish-white ; femora and tibiæ above, posterior tarsi and apex of tibiæ almost entirely, and the joints of anterior tarsi annulated with, black ; calcaria black, pale at the base. Wings hyaline, the apex somewhat fuscescent, costa and stigma black. Abdomen longer than the head and thorax ; the dorsal surface, except at the sides, black, the juncture of the segments, and blotch, sides and belly greenish-white. Sheath projecting, hairy, its apex black.

♂ smaller ; there is only a somewhat triangular black mark on each of the abdominal segments, and the whole of the legs are lined with black above throughout. Sometimes the abdomen has the dorsal surface entirely black.

Length 5—6 lines.

This insect has frequently been confounded with *T. viridis*, from which it may be easily distinguished by its black antennæ, more strongly punctured mesonotum, black stigma, and shorter and thicker antennæ. The same well-marked characters separate it from the much smaller *T. picta*.

The larva feeds in the autumn months on various species of *Ranunculus*, *Heracleum*, and, I think also, on *Veronica*. When at rest it lies rolled up in a ball on the underside of the leaf, from which it drops to the ground on the slightest approach of danger; and it ejects from the mouth a dirty brownish liquid when alarmed. It eats irregular holes in the centre of the leaves, and more rarely along the sides. Its head is deep shining black; mouth parts pale; upper parts of the body deep black; the lower part of the sides pale, spotted irregularly with brown. Legs white, claws black. The skin is covered with small white tubercles, each ending in a short hair. When full fed it becomes olive green. It pupates in the earth, forming a cocoon of the earth. Length 12 lines.

The perfect insect is found everywhere, from Orkney southwards, during June and July on the flowers of *Compositæ*, *Ranunculus*, &c. It is very carnivorous.

It abounds from Scandinavia to Italy and the Ural Mountains.

18. Tenthredo obsoleta.

Tenthredo obsoleta, Klug, Berl. Mag., viii, 192, 135; Htg., Blattw., 310, 44; Thoms., Hym. Scand., i, 272, 4; Cam., Fauna, 13, 12; Evers., Bull. Mosc., xx, 52, 27 (? ?); André, Species, i, 454, Cat., 58,* 46.

Black; clypeus, labrum, two spots above antennæ, tegulæ, edge of pronotum, two lines on pleuræ, scutellum, two small marks behind it, the abdomen beneath and at the sides greenish-white. Legs greenish-white; a line on coxæ, a line over the femora, tibiæ and tarsi black; the anterior tarsi have only the apices of the joints black. Antennæ not much longer than the head and thorax; vertex densely covered with long hairs; mandibles piceous-black. Wings sub-hyaline, scarcely darkened at the apex; costa and stigma black, the former being pale at the extreme base; the latter paler on the lower side.

The ♂ I have not seen, but it is stated by Thomson to be similarly marked to the female.

Length 5½ lines.

Very like *mesomela*, but differs in having the pleuræ and sternum black, except one or two green splashes on the former; antennæ much shorter and thicker at the apex, the last joint being shorter in proportion to the eighth; wings are clearer and scarcely darker at the apex than at the base; the whole insect, too, is shorter and of a slighter build. The part of the head above the clypeus is black except two small green marks above the antennæ.

From *T. arctica*, Thoms. (which is not British), it may be known by the completely green scutellum; *artica* having also the posterior tarsi largely white beneath, the pleuræ black, and breast green behind.

Obsoleta seems to be much rarer than *mesomela*, but probably it will be confounded with that species. I have only seen one or two specimens from Possil Marsh, near Glasgow.

The only continental localities I have noted are Lapland, Silesia, Göttengen, and Russia, if Eversmann be correct.

Body olive-green, slightly marked with black above. Antennæ and legs lined with black on the upper side. Antennæ long, not thickened at apex. Eyes converging, not reaching to base of mandibles. Clypeus deeply incised. Thorax smooth, shining. (Species 19).

19. TENTHREDO OLIVACEA.

***Tenthredo olivacea*, Klug, Berl. Mag., viii, 193, 137; Htg., Blattw., 309, 42; Thoms., Hym. Scand., i, 273, 6; Cam., Fauna, 13, 14; André, Species, i, 459; Cat., 58,* 45.**

Pale olive-green, antennæ above, some lines on the vertex, sutures of the mesonotum, a line in the centre of the front lobe of the same, and at the sides in front of metanotum, one on the upper part of the legs and the dorsum of abdomen black. Antennæ as long as the abdomen, thin; apices of the mandibles brownish-black; vertex slightly hairy; mesonotum finely punctured, and covered with a very short pile. Saw large, projecting, extreme apex of sheath black. Wings hyaline, costa and stigma greenish; nervures black. The anterior tarsi only annulated with black. ♂ and ♀.

Length 5½—6½ lines.

Ab.—Dorsum of abdomen without any black.

The black markings on the antennæ, head, thorax, and abdomen vary in intensity.

Easily known from the other green species of *Tenthredo* by the olive-green colour. From *punctulata* and *scalaris* it may also be readily separated by the black on the posterior tarsi being continuous, while the other two species have the joints annulated.

A very common species in the north, but does not seem to occur farther south than the midland counties of England. In Scotland I usually capture it on birch, and have taken it at an elevation of upwards of 2000 feet.

It is met with in the middle and south of Sweden, in Silesia, Austria, and France.

SECTION 2.—*Mesonotum smooth, unpunctured. Humeral cellule in hind wings appendiculated. Cheeks distinct.*

Green, marked with black. Antennæ long, thin, lined with black above. Clypeus deeply emarginated. Stigma green or pale. Legs lined with black above. (Species 20—22).

20. TENTHREDO PUNCTULATA.

Tenthredo punctulata, Klug, Berl. Mag., viii, 185, 139; Htg., Blattw., 309, 40; Kalt., Pfl. 431 and 582, Cam., Fauna, 13, 15.
Allantus punctulatus, Ste., Ill., vii, 69, 36.
Perineura punctulata, Thoms., Hym. Scand., i, 270, 11; André, Species, i, 437, Cat., 52,* 2.

Green; antennæ on the upper side, the sutures on vertex; sutures of the head behind; sutures of mesonotum and pleuræ; a row of small dots (two to each segment) along the edge of the abdomen above, the sheath at the apex, a narrow line on upper side of femora, tibiæ and joints of the tarsi at their apices, as well as the apex of posterior tibiæ all round, black. Antennæ filiform. Wings hyaline; costa and stigma green. The mandibles are brown at the apex; the vertex pilose. ♂ and ♀.

Length 4½—5½ lines.

Ab.—Apical half of the abdomen blackish above.

Easily known from *viridis* by the greenish abdomen with the black lateral spots, the smaller black marks on the head and mesonotum, less projecting front and thinner antennæ.

The larva, according to Kaltenbach, is 8—10‴ long, green, bare, with a yellowish head. It rests in September on and under the leaves of the ash, in which it devours holes. Elsewhere[*] in his book the same author says that Letzner found the larvæ on the Riesengeberge at an elevation of 4000′, on bushes of *Salix limosa*, the leaves of which they destroyed. They fed also on *Salix aurita* and *S. silesiaca*.

The pupa state is passed in the ground.

Punctulata is more or less abundant everywhere in Britain.

Continental distribution: Sweden, France, Holland, Switzerland, Germany, Italy.

21. TENTHREDO VIRIDIS.

Pl. VIII, fig. 4, Saw.

Tenthredo viridis, Lin., S. N., Ed. xii, 924, 27; Fab., S. E., ii, 113, 33.
— — Pz., F. G., lxiv, fig. 2; Don., B. E., xiii, 23, pl. 444; Lep. Mon., 85, 247.
— *scalaris*, Kl., Berl. Mag., viii, 194, 138; Htg., Blattw., 309, 41; Evers., Bull.Mosc., xx, 51, 25; Cam., Fauna, 13, 16; Stein, Ent. Nacht., vi, 248 (lar.).
Perineura viridis, Thoms., Hym. Sc., i, 269, 9; André, Species, i, 437, pl. xxi, fig. 4, 5, and 11; Cat., 52,* 4.
Perineura scalaris, Thoms., Hym. Scand., i, 269, 10.
Allantus scalaris, Ste., Ill., vii, 70, 38.

Green, with a yellowish tinge; antennæ on the upper side; an oblong-oval mark on the vertex, surrounding the ocelli, with two small green marks in its centre; mesonotum, with the exception of two pairs of green marks in front; scutellum, a line in front of post-scutellum; a small mark behind cenchri; abdomen broadly in the centre, a line above the femora and tibiæ, apex of tibiæ, and of the joints of tarsi black. Mandibles green, black at the apex. Wings hyaline, nervures fuscous black, stigma and costa green.

♂ similar, but with the green marks on the mesonotum wider, the black band on the abdomen much thinner and interrupted, and antennæ longer.

Length 5½—6½ lines.

A species very variable in coloration, especially in the relative amount of black with which it is marked.

---

[*] Under the name of *punctata*, presumedly a mistake.

An aberration is sometimes seen with the abdomen entirely green.

Not unlike *T. picta*, but much larger; the mark on the vertex is much smaller and distinctly separated; the green marks on the mesonotum are larger; there is a pair in front of the scutellum and behind it which are not found in *picta;* the black band on the abdomen is narrower, there is no black on sternum, the tarsal joints are only annulated with black; and the radial nervure is always received not far from the middle of the third cellule, never interstitial.

One of our commonest species, appearing in June and July; often met with on *Umbelliferæ*, which they frequent more for the purpose of killing other insects than to eat the pollen.

The larva is described by Stein as having a dirty olive-green body, varied with a series of darker or clearer spots, and bearing on each segment two transverse series of tubercles; the head is greyish-green, obscured with black, and pilose. It lives from August to October on the leaves of sundry willows (*Salix alba*, *vitellina*, &c.), eating from the edge of the leaf to the midrib, and only during the night. It pupates in the earth. Dours (Cat., 23) says that it feeds also on birch.

Viridis is probably one of the widest distributed species in the genus, being found all over the Palæarctic region including Japan.

Obs.—Thomson (l. c.) separates *T. viridis*, L., from *T. scalaris*, Klug, by the greater extension of the black colour on the vertex, mesonotum and dorsum of abdomen, by its shorter antennæ, less developed patellæ, and by the suture of meso-pleuræ being lined with black. I have never been able to distinguish two forms, and thought at one time (as did also van Vollenhoven) that Thomson's *viridis* was *picta*, Klug, but he gives the same size to *viridis* as *scalaris*, while the latter is a couple of lines larger. In the Linnean Collection *viridis* is represented by two specimens, a ♀ *picta* and a ♂ *scalaris*.

22. TENTHREDO PICTA.

Pl. VIII, fig. 7, ♂.

Tenthredo picta, Klug, Berl. Mag., viii, 195, 140; Htg., Blattw., 309, 39; Evers., Bull. Mosc., xx, 51, 24.
Perineura picta, André, Species, i, 435; Cat., 52,* 4.
Allantus pictus, Ste., Ill., vii, 39, 70.
Tenthredo viridis, Cam., Fauna, 14, 17.
— *seesana*, Rudow, S. E. Z., 1871, 388.

Pale green; antennæ a little shorter than the abdomen, black, pale green beneath, except with the second joint which is entirely black. Head black, face from above the antennæ, inner orbits of the eyes to near the ocelli, where it (the green mark) terminates in a club-shaped mark on each side; two spots above the antennæ, connected with the face, and the outer orbits of the eyes to near the top, light green; covered with a longish, whitish pile except on the vertex; mandibles brownish-red; palpi pale green. Mesonotum black; two pairs of spots, one behind the other, green. Pronotum, pleuræ and sternum (except a brown-black mark on its centre) light green. Scutellum, post-scutellum and cenchri of the same colour. Legs green, a black line over the femora, tibiæ and tarsi, and the apex of the tibia all round, black. Sometimes the tarsi are entirely black. Wings hyaline, iridescent, stigma green, generally fuscous at the apex; transverse radial nervure interstitial, or received in the fourth cubital cellule. Abdomen black above except at the edges, apex, and junction of the segments, which as well as the belly, are green. The ventral segments are irregularly spotted with black. ♀ and ♂.

Length 3½—3¾ lines.

The larva according to André is greenish-yellow, with black legs (claws?), and the skin covered with brown, hair bearing tubercles. It feeds on the alder, on the leaves of which the ♀ lays her eggs on the nervures.

Easily known by its small size (for the group), black head, and broad black band on breast.

Not very common, appearing in marshy places in June.

I have seen specimens from Sutherlandshire, Braemar, Glasgow, Worcester, Glanvilles' Wootton, and the London districts. Stephens gives Darenth Wood and Dover as localities.

It is found in Sweden, Germany and Russia.

Obs.—It may be noted that the green colour in the costa and stigma is very fleeting, and hence the stigma is frequently quite white, while often the dissolved green colour spreads over the neighbouring parts of the wing.

Antennæ short, pale on the underside, stigma pale at the base, clypeus truncated at the apex. Abdomen banded with red. Legs reddish. Hinder tarsi shorter than tibiæ; cubital and recurrent nervures in hind wings straight. Body small. (Species 23 and 24.)

23. TENTHREDO LATERALIS.

Tenthredo lateralis, Fab., S. E., ii, 118, 71; S. P., 35, 29; Pz., F. G., lxxxviii, fig. 16; Lep., Mon., 79, 233; Fall., Acta, 1808, 100, 31; Kl., Berl. Mag., viii, 212, 167; Htg., Blattw., 304, 17; Evers., Bull. Mosc., xx, 46, 10; Cam., Fauna, 14, 19.
Allantus — Ste., Ill., vii, 71, 41.
Perineura — Thoms., Opus., 302, 6; Hym. Scand., i, 268, 7; André, Species, i, 417, Cat., 53,* 17.

Body short, black, shining, inner orbits of the eyes, tegulæ, pronotum and abdomen at the sides, yellowish-white; the third, fifth, and part of sixth abdominal segments above, and legs reddish. Antennæ as long as the abdomen, above black, underneath pale testaceous. Head pilose in front. Trochanters yellowish-white; extreme apex of posterior tibiæ and tarsi black; anterior tarsi fuscous. Wings hyaline, costa testaceous; stigma fuscous; the third cubital cellule not much longer than the second.

The ♂ has the face from below the antennæ, the belly, and thorax beneath, yellow, with a black mark on the pleuræ, and the legs are lined above with black. Sometimes, too, the orbits of the eyes are pale behind. The third cubital cellule seems to be shorter than in the ♀. I have one specimen from Braemar with the costa and stigma yellowish-white, and the dorsum of abdomen of the same colour, with a pale brown mark on each segment. The line on the legs too is very narrow.

Length 3⅓ lines.

A common species in May and early in June, generally among herbage. I have often seen it on *Veronica*. I have examined specimens from Clydesdale, Manchester, Gloucester, Worcester, Glanvilles' Wootton, Devonshire, London district, and Norwich. Stephens records it from Bristol.

It abounds in Scandinavia, Germany, Holland, France, Switzerland, Hungary, Italy, and Russia.

24. TENTHREDO GIBBOSA.

Pl. VIII, fig. 8, ♀.

Tenthredo gibbosa, Fall., Acta, 1808, 64, 26.
— *aucupariæ*, Klug, Berl. Mag., viii, 202, 168; Htg., Blattw., 304, 16.
— *juvenilis*, Lep., F. Fr., pl. 6, fig. 5; Mon., 99, 279.
— *gibbosa*, Cam., Fauna, 14, 18.
Allantus aucupariæ, Ste., Ill., vii, 71, 42.
Perineura gibbosa, Thoms., Opus., 302, 5.
— *solitaria*, Thoms., Hym. Scand., i, 268, 8; André, Species, i, 418; Cat., 53,* 18.

Black, shining; pronotum and tegulæ yellowish-white, the three or four middle segments of the abdomen and legs reddish, coxæ, trochanters, apex of posterior femora, tibiæ and tarsi black. Antennæ testaceous on the underside; labrum and palpi white. Wings hyaline, costa and stigma fuscous, pale at the base; the tr. radial nervure is received near the middle of the cellule, or a very little beyond it; the third cubital cellule is longer than the second.

The ♂ has the femora lined above with black.

Length 3½ lines.

Distinguished from *lateralis* by the absence of the white lateral band on the abdomen, by the legs being black at the base, the eyes not surrounded with white; the third cubital cellule distinctly longer than the second, and by the tr. radial nervure being received near the middle of the cellule. With the ♂ it is only the femora that are lined with black above and the pleuræ and breast are not white.

This species is equally common with *lateralis*, and makes its appearance about the same time. It is found in Braemar, Clydesdale, Berwickshire, Worcester, Devonshire, the new Forest, Darenth and Coombe Woods, Norwich.

On the Continent it has been recorded from Scandinavia, Germany, Holland, France, Switzerland, Italy, Tyrol, and Hungary.

Genus TENTHREDOPSIS.

Tenthredopsis, Costa, Fauna di Napoli, 98 (1861).
Tenthredo, Auct.
Perineura, Thoms., André, in part.

Wings: lanceolate cellule with a very short perpendicular nervure; accessory nervure in posterior wing appendiculated. In the male the transverse nervures in the posterior wings are usually situated along the outer edge of the wing, all being united together with the accessory nervure, so that thus there are no middle cellules. This arrangement, however, is not always constant, the transverse cubital especially being seldom out of its normal position in the centre of the cellule.

Antennæ long, filiform, the third and fourth joints subequal.

Clypeus truncated at the apex, seldom incised.

The mandibles are weak, with only one short subapical tooth. The body is longish, smooth, shining, impunctate, except very rarely on the pleuræ. On the thorax the scutellum and post-scutellum are always white. The blotch is never present.

The species of *Tenthredopsis* are very similarly marked; the ground colour differs in being black or yellow; but whatever it may be there are (so far as I know) some white markings on the mesonotum, and the stigma is either of two colours, white at the apex, black or fuscous at the base, or entirely white. When the ground colour is black the abdomen has, as a rule, the apex, or the middle, marked with red; the general colour of the legs being also red. All the species are very variable in coloration; so variable, indeed, that by Klug and Hartig they were all regarded as varieties of one species which the former author named *instabilis*.

The separation of the species is difficult owing to their great uniformity in form and sculpture, and the consequent difficulty of finding structural characters of any importance which can be used in specific discrimination. In the form of the saw we have an excellent character for separating the females, but it is difficult of examination and fails us with the males. Much remains to be done in the way of assigning the males to their proper partners; while we are completely ignorant of the earlier stages of all the species.

I do not know if the species of *Tenthredopsis* occur beyond the European subregion of the Palæarctic region.

Synopsis of species.

1 (27) Body for the greater part black.
2 (5) Abdomen red at the apex.
3 (4) Legs entirely red. *Cordata.*
4 (3) Hind legs for the greater part black. *Femoralis.*
5 (8) Abdomen entirely black.
6 (7) Legs red. *Microcephala.*
7 (6) Legs for greater part black. *Caliginosa.*
8 (20) Abdomen red in the middle.
9 (14) Pronotum and coxæ entirely black.
10 (11) Posterior femora black. *Nigricollis.*
11 (10) Legs red.
12 (13) Antennæ short, hinder knees black, the red on abdomen not spotted with black. *Ignobilis.*
13 (12) Antennæ longish, the red on abdomen spotted with black, knees black. *Nigronotata.*
14 (9) Pronotum, coxæ, and femora lined with white, the red on abdomen marked with black in the middle.
15 (16) Hinder femora black. *Scutellaris.*
16 (15) Hinder femora red.
17 (18) Clypeus deeply incised, tegulæ white. *Ornata.*
18 (17) Clypeus not deeply incised, tegulæ not white, the red on abdomen marked with black, a broad yellow line on basal segment, tegulæ black. *Flavomaculata.*
19 (18) The red on abdomen not marked with black, tegulæ fuscous. *Picticeps.*
20 (8) Abdomen testaceous at the sides and beneath.
21 (22) Head and thorax not testaceous, a yellow line at base of abdomen, hinder femora black. *Tristis.*
22 (21) Head more or less testaceous.
23 (24) Thorax entirely black, hinder femora black. *Fulviceps.*
24 (23) Thorax lined with white on pronotum or pleuræ.
25 (26) Vertex for greater part black, mesopleuræ and sternum dashed with brown spots. *Lividiventris.*
26 (25) Vertex for the greater part testaceous, mesopleuræ with a large white mark. *Albomaculata.*
27 (1) Body for the greater part luteous.
28 (29) Head below the ocelli deep black, hinder femora for greater part black. *Nigriceps.*
29 (28) Head below ocelli luteous.
30 (31) Mesopleuræ and sternum black, coxæ and base of femora black. *Saundersi.*
31 (30) Mesopleuræ and sternum luteous.
32 (33) Metapleuræ black. *Dorsivittata.*
33 (32) Metapleuræ luteous.
33 (36) Coxæ and sutures of meso- and metapleuræ marked with black.
34 (35) Calcaria short, second recurrent nervure not interstitial. *Inornata.*
35 (34) Calcaria long, second recurrent nervure interstitial. *Nassata.*
36 (33) Coxæ and sutures of pleuræ marked with yellow and white. *Sordida.*

1. TENTHREDOPSIS CORDATA.

Pl. XVI, fig. 4 and 8, Saw.; Pl. VIII, fig. 9, ♀.

Tenthredo cordata, Fourc., I. P., ii, 15.
— *dimidiata*, Fab., S. P., 42, 61; Lep., Mon., 83, 244, F. Fr., pl. 4, fig. 2; Ste., Ill., vii, 79, 21.
— *instabilis*, var. *dimidiata*, Kl., Berl. Mag., viii, 198, 142; Htg., Blattw., 308, 37; Evers., Bull. Mosc., xx, 49, 22.
— *coquebertii*, Klug, Berl. Mag., viii, 202, 147.
— *analis*, Ste., Ill., vii, 80, 22.
Perineura nassata, Thoms., Opus., 301, 1; Hym. Sc., i, 265; Cam., Fauna, 14, 1; 51.
— *cordata*, André, Species, i, 431, Cat., 54,* 36.
Tenthredopsis cordatus, Cam., Tr., Ent. Soc., 1881, 566.

Black, smooth, shining; mouth, scutellum, two spots behind and cenchri white; legs and three to five apical segments of abdomen red; coxæ, trochanters, and base of femora black; posterior tarsi marked with black; the apices of the joints occasionally pale. Wings hyaline, costa fuscous, stigma darker, white at base; antennæ pitchy beneath.

The ♂ has the abdomen red or testaceous red, except the two basal segments above; the hinder femora and the tibiæ black, as well as the metatarsus, the second, third, and fourth joints of tarsi being whitish; the last abdominal segment rounded, emarginated in the middle, and with two distinct depressions above.

Ab.—*a.* Scutellar spots black.
„ —*b.* Inner orbits of eyes white.

Length 6—7¼ lines.

A tolerably common and widely distributed species. Clydesdale, Polmont, Kinguissie, Manchester, Gloucester, London district, Norwich.

Continental distribution: Sweden, Russia, Germany, Holland, France, Switzerland, Italy.

2. TENTHREDOPSIS MICROCEPHALA.

Pl. XVI, fig. 5, Saw.

Tenthredo microcephala, Lep., F. Fr., pl. 4, fig. 1; Mon., 80, 238; Ste., Ill., vii, 78, 18; André, Species, i, 439, Cat., 55,* 1.
— *orbitalis*, Dietrich, Mitth. Schw. Ent., 1868, 354 (1868).
Tenthredopsis microcephalus, Cam., Tr. Ent. Soc., 1881, 566.

Black, smooth, shining; labrum, clypeus, mandibles, inner orbits of the eyes, scutellum, two spots behind, and cenchri white; legs pale red; the apical joints of hinder tarsi more or less black; antennæ black to pitchy. Wings hyaline, costa fuscous, extreme base paler; second recurrent nervure interstitial, or nearly so.

♂ antennæ thickish, black above, fuscous beneath; orbits of eyes, a spot behind, and mouth white. Abdomen black, legs testaceous; coxæ, trochanters, base of middle femora, and hinder pair entirely black; posterior tibiæ pitchy; metatarsus of hinder legs pitchy; other joints white.

Length 4¾—6¼ lines.

Scarcely to be distinguished from *cordata* except by the form of the saw and the colour of abdomen, and that cannot be a constant test if *cordata* has, as has been reported by authors, sometimes the abdomen entirely black. It varies like *cordata* in having the orbits of the eyes and scutellar spots often black.

The species is not uncommon in the South of England, also in Scotland, according to Stephens, but I have never seen it there myself.

Continental distribution: France, Switzerland.

3. TENTHREDOPSIS FEMORALIS.

Pl. XVI, fig. 6, Saw.

Tenthredo femoralis, Stephens, Ill., vii, 80, 23.
Tenthredopsis femoralis, Cam., Tr. Ent. Soc., 1881, 566.

Black; clypeus, labrum, mandibles, inner and outer orbits of eyes, and scutellar spots yellowish-white; three to five apical segments of abdomen bright red; legs pitchy black, four anterior tibiæ and tarsi testaceous, middle joints of hinder tarsi white. Wings hyaline. Antennæ black, pitchy beneath. ♀.

Length 5½ lines.

Easily known from *cordata* by the black femora; it is smaller, the abdomen bulges out more at the centre, and the form of the saw is very different.

Rare; taken in the London district, and at Dover, in June, according to Stephens. Also at Dumfries in June.

4. TENTHREDOPSIS CALIGINOSA.

Pl. XVI, fig. 7, Saw.

Tenthredo caliginosa, Ste., Ill., vii, 78, 17.
Tenthredopsis caliginosus, Cam., Tr. Ent. Soc., 1881, 566.

Black; labrum, clypeus, scutellar spots white or yellowish-white; legs dull testaceous; hinder femora, middle femora to the middle, and front at extreme base, with all the coxæ, black; hinder tarsi fuscous; hinder tibiæ much darker than anterior, sometimes pitchy. Antennæ black, pitchy beneath. Wings hyaline; tegulæ black. ♀.

Ab. ♀ trochanters and a thin line on base of abdomen white; sides of abdomen in middle faintly testaceous; hinder tibiæ testaceous.

♂ black; orbits of eyes broadly, mouth, trochanters, and a faint line on base of abdomen white; the belly in middle and anal segment above testaceous; hinder femora black; hinder tarsi pale testaceous. Antennæ bright testaceous with a fuscous line above.

Length 5—6 lines.

Stephens records it as "not very uncommon within the metropolitan district in June." In Scotland it occurs in Clydesdale and Dumfries, but is rare.

In the coloration of the legs it resembles *femoralis*, but it differs in having the abdomen entirely black; the third joint is longer compared to the fourth, and the saw is very different. *Microcephala* is larger, has the antennæ longer, the abdomen more sharply pointed. From the darker specimens of *tristis* it may be easily known by having the coxæ and trochanters black, spurs and antennæ longer, third joint of antennæ much longer than fourth, and the pronotum quite black.

5. TENTHREDOPSIS NIGRONOTATA.

Pl. XVII, fig. 9, Saw.

Tenthredopsis nigronotatus, Cam., Tr. Ent. Soc., 1881, 566.

Black; labrum, clypeus, mandibles, margins of eyes, a spot behind them, and scutellar spots white; legs and third, fourth, and fifth abdominal segments in part bright red; coxæ, trochanters, and a line down the centre of the third, fourth, and fifth abdominal segments above black; hinder tarsi faintly fuscous, darker at the apices. Antennæ black, fuscous beneath. Wings hyaline; tegulæ black.

Length nearly 6 lines.

Very similar in coloration to *ignobilis*, but larger and stouter, antennæ and spurs longer, antennal fovea deeper, clypeus yellow and not so transverse at the apex, and abdomen with only three red segments, which are marked with black in the middle.

Rare; two specimens in Shuckard's collection.

6. TENTHREDOPSIS IGNOBILIS.

Pl. XVII, fig. 1, Saw.

Tenthredo ignobilis, Klug, Berl. Mag., viii, 205, 151? Htg., Blattw., 306, 29; André, Species, i, 443; Cat., 55,* 11; Ste., Ill., vii, 79, 19; *non* Thoms.
— *stigma*, Lep., Mon., 76, 226?
Tenthredopsis ignobilis, Cam., Tr. Ent. Soc., 1881, 567.

Black; labrum, a thin line on inner side of eyes and a spot behind, and scutellar spots white; the second to sixth abdominal segments and legs bright red; coxæ, trochanters, base, and apex of hinder femora black; hinder tarsi fuscous, the second to fourth joints paler. Antennæ black, pale on under side; a dull reddish splash on each of the middle lobes of mesonotum. Wings hyaline; costa pale; stigma fuscous at apex.

Length 4½—5 lines.

The second segment is usually only black on basal half above, and the red colour sometimes extends to the last segment. The white on the head is generally very obscure, and the white mark behind the eyes may be invisible. It is a broader insect than *scutellaris*, and the abdomen is more inflated.

I have only seen three specimens of this species, two from Rannoch, and one from Inverness-shire.

Continental distribution: France, Germany, Switzerland (?)

Obs. It is doubtful if this species is either *ignobilis*, Kl., or *stigma*, Lep. The latter is quoted as a synonym of *ignobilis* by Hartig, but the description will fit several species. *Ignobilis* is a true *Tenthredo* according to Thomson, and if that be a correct determination Klug's species has no relationship with mine, which may be regarded as a new species and may still be called *ignobilis*.

7. TENTHREDOPSIS NIGRICOLLIS.

Pl. XVII, fig. 2, Saw.; Pl. XII, fig. 17, Mandible.

Tenthredo scutellaris, Lep., Mon., 76, 225; Ste., Ill., vii, 76, 10; *non* Fab.
— *pavida*, Lep., Mon., 76, 227; Ste., Ill., vii, 76, 11; *non* Fab.
Tenthredopsis nigricollis, Cam., Tr. Ent. Soc., 1881, 567.

Black; labrum and scutellar spots white; the third to fifth or sixth abdominal segments bright red; legs testaceous; coxæ, trochanters, and base of four anterior femora, and the whole of hinder femora black; apex of hinder tibiæ and the tarsi fuscous; antennæ black, pitchy beneath. Wings hyaline; tegulæ black.

The ♂ has the middle of the abdomen obscure red, the hinder tibiæ and metatarsus black, the rest of tarsi white. The clypeus is mostly black.

Length 4½—5 lines.

Similar in structure to *ignobilis*, but differing from it in the darker legs, in having the red band on abdomen narrower, and in the mesonotum being entirely black.

A widely distributed species; Clydesdale, Rannoch, Lochaweside, South of England.

Continental distribution: France.

8. TENTHREDOPSIS SCUTELLARIS.

Pl. XVII, fig. 3, Saw.

Tenthredo scutellaris, Fab., S. P., 39, 51.
— *instabilis*, var. f., Klug, Berl. Mag., viii, 198, 142; Htg., Blattw., 308, 37; Evers., Bull. Mosc., xx, 49, 22, var. 2—5.
— *ambigua*, Klug, Berl. Mag., viii, 202, 146; Htg., Blattw., 307, 34; Ste., Ill., vii, 76, 9.
Perineura brevispina, Thoms, Opus., 301, 2; Hym. Sc., i, 296, 2.
— *scutellaris*, Cam., Fauna, 52; André, Species, i, 433; Cat., 54,* 35.
Tenthredopsis scutellaris, Cam., Tr. Ent. Soc., 1881, 567.

Black, shining; mandibles, labrum, clypeus, orbits of eyes, a line on pronotum, and scutellar spots yellow; the three or four middle segments of abdomen (save an interrupted black line in the centre) and legs testaceous; the base of front and middle femora, and the greater part of hinder pair black; hinder tarsi more or less fuscous; trochanters and a streak on coxæ white. Antennæ black, piceous or pitchy beneath; the third joint a very little longer than fourth; clypeus slightly incised. Wings hyaline; tegulæ pale, rarely black.

The ♂ is similar in coloration, except that the red on abdomen is more obscure, more extended, but the abdomen is often black in the middle; the hinder femora are testaceous, or for the greater part pitchy; the coxæ bear more white than with the ♀, and the antennæ are lighter coloured.

Length 4½—5½ lines.

Ab.—*a.* Middle femora entirely, and hinder tibiæ and tarsi, except last joint, black; middle tibiæ and four front tarsi pitchy; mandibles black; antennæ with only the apical joints pitchy beneath; post-scutellar spots black.

Ab.—*b.* Abdomen testaceous at the sides on middle segments.

c. Orbits of the eyes black.

d. Edge of pronotum and of basal segment of abdomen yellow.

e. Eyes entirely surrounded with white; hinder tarsi pitchy, with the third and fourth joints white.

f. Tegulæ white.

g. Abdomen without black marks on red.

h. Abdomen with a broad black band on red.

May be known from *nigricollis* by its longer antennæ, which have the third joint not much longer than fourth; the clypeus is not transverse at the apex, and it is always yellow, the antennal fovea is deeper, and it differs otherwise in the colour of thorax and legs (at the base). From *flavomaculata* the brighter coloured varieties are not always easily separated, but, as a rule *flavomaculata* may be known from it by the wider extension of the yellow (which is much brighter than in *scutellaris*) on the head, thorax, and base of abdomen, the antennæ are shorter, the frontal area wider and more circular at the top, and the head is longer and thicker behind. The ♂ is easily known from the ♂ of *nigricollis* by the thorax being lined with white, and the legs pale at the base.

Not uncommon on birch everywhere in Britain.

Continental distribution: Sweden, Holland, Germany, France, Italy, Russia, Spain, and Portugal.

9. TENTHREDOPSIS FLAVOMACULATA.

Pl. XVII, fig. 4, Saw.

Tenthredopsis flavomaculatus, Cam., Tr. Ent. Soc., 1881, 567.

Black, shining, pilose; labrum, clypeus, mandibles, orbits, a longish spot behind the eyes, edge of pronotum, scutellar spots, sometimes a few minute spots on mesonotum, a broad band on base of abdomen, and an irregular spot on coxæ bright yellow. Antennæ pitchy; edge of second, the whole of third, fourth, fifth, and side of sixth abdominal segment bright testaceous red. Legs bright testaceous; coxæ for greater part and base (sometimes a line above) of hinder femora black; hinder tarsi more or less fuscous. Wings hyaline; costa and stigma fuscous, the latter white at base.

The ♂ is similarly coloured to the ♀, save that the abdomen has only faint indications of the testaceous colour on the middle segments and beneath; the antennæ, if anything, are lighter coloured on lower side, the hinder femora are entirely black, and the tibiæ and tarsi pitchy. The last segment above bears two deep depressions, and the yellow line on base is scarcely visible.

Length 4½ lines.

Very similar to *picticeps*, but shorter and broader; the antennæ shorter, head wider, head and thorax more shining, and the band on the base of abdomen much wider. The saw is very different. Sometimes the red abdominal segments have an indistinct black line in the middle.

Not common. Mull, Rannoch, Devonshire (*E. Parfitt*).

10. TENTHREDOPSIS PICTICEPS.

Pl. XVII, fig. 5, Saw.

Tenthredopsis picticeps, Cam., Tr. Ent. Soc., 1881, 568.

Black; labrum, clypeus, orbits of eyes, a line on pronotum, scutellar spots, the third to sixth segments of abdomen all round, and legs bright red; coxæ black, largely white behind; trochanters white; hinder femora black at the base; posterior tarsi fuscous at apex. Wings hyaline; tegulæ fuscous. Antennæ longish, pale beneath.

Length 5 lines.

Allied to *ornata*, but it has the incision in clypeus not so deep, the eyes are marked with yellow all round, antennæ longer and thinner, with the third joint not so long in proportion to the fourth, and the pleuræ are scarcely punctured; *ornata*, too, has the clypeus black.

Rare. Scotland.

11. TENTHREDOPSIS ORNATA.

Tenthredo ornata, Lep., F. Fr., pl. 3, fig. 5; Mon., 77, 228; Ste., Ill., vii, 12.
Perineura excisa, Thoms, Opus., 301, 3; Hym. Sc., i, 267, 5.
— *ornata*, André, Species, i, 427; Cat., 54,* 33.
Tenthredopsis ornatus, Cam., Tr. Ent. Soc., 1881, 568.

Black, smooth, shining; mandibles, clypeus, labrum, more or less of the orbits of the eyes, edge of pronotum, tegulæ, scutellar spots yellowish-white; the second abdominal segments at the sides, the third, fourth, fifth, sixth and seventh in part reddish-testaceous, with a black dot on each in the middle. Legs reddish-testaceous; coxæ, base, and sometimes the apex of hinder femora black; coxæ and trochanters more or less white. Antennæ pitchy beneath, the third joint distinctly longer than fourth. Wings hyaline. Pleuræ punctured above. Abdomen beneath with two broad black bands along the sides.

The ♂ has the legs more marked with black, and the abdomen is for the most part entirely black above.

Length 4½—5 lines.

Tenthredopsis dorsata, Spin., is very like this insect; it is a broader and stouter species; antennæ are shorter and stouter, the abdomen has only four segments red, and the wings are fuscous.

T. ornata is not common in Britain; I have only seen a few specimens from the south of England and from Norwich.

Continental distribution: Sweden, France, Switzerland, Italy, Russia.

12. TENTHREDOPSIS TRISTIS.

Pl. XVII, fig. 6, Saw.

Tenthredo tristis, Ste., Ill., vii, 78, 15.
— *spreta*, Lep., Mon., 78, 231; Ste., Ill., vii, 77, 14?
Tenthredopsis tristis, Cam., Tr. Ent. Soc., 1881, 568.

Black; labrum, clypeus, mandibles, orbits, a spot behind each eye, a line on the pronotum, scutellar spots, and a line on basal segment of abdomen yellow. Legs testaceous; coxæ, middle femora at base, and hinder pair entirely black; coxæ broadly marked with yellowish-white; trochanters white; hinder tarsi more or less fuscous; the third, fourth, fifth, and sixth segments of abdomen with a triangular spot on the side, which is occasionally extended to the ventral surface, and, more rarely, across the junction of the segments above.

The ♂ has the antennæ longer and pale testaceous beneath; the mouth and orbits of the eyes broadly yellow; the testaceous spots on sides of abdomen narrower; the white marks on coxæ also narrower; the trochanters marked with black; hinder tibiæ somewhat piceous, and tarsi fuscous. The tegulæ are pale; the fovea on anal segment is very deep at the apex, and the depression does not reach the base of the segment.

Length 4—5 lines.

This species is not unlike *caliginosa*, but it is readily separated by the pale colour on pronotum and base of legs, besides being a narrower and more slender insect, with somewhat shorter antennæ; from *lividiventris* it is known by the head and pleuræ wanting the testaceous colour, and the abdomen is only testaceous at the sides, not through its entire extent.

Not common. Near London (Stephens), Clydesdale, Lochaweside, Aberdeen (Trail).

13. TENTHREDOPSIS FULVICEPS.

Tenthredo fulviceps, Ste., Ill., vii, 75, 8.
Tenthredopsis fulviceps, Cam., Tr. Ent. Soc., 1881, 568.

Black; mandibles, labrum, clypeus, scutellum and scutellar spots yellow; orbits of eyes broadly pale testaceous; the eyes on inner side with a thin yellow line, and there is a broader and longer yellow mark behind them; the third to sixth segments of abdomen beneath and at the sides dark reddish-testaceous. Legs dark testaceous; coxæ, trochanters, and hinder femora black; hinder tibiæ testaceous at base, the rest of it piceous; hinder tarsi pale; coxæ and trochanters streaked with white; calcaria scarcely reaching to middle of metatarsus. The middle furrow on vertex is scarcely indicated behind, but a little behind the ocelli is seen as a deep groove, which is prolonged between the ocelli, while at the base of these there is a transverse groove, so that the two furrows form a well-marked cross; the frontal area is distinct, wide, and shallow; antennal fovea deep; clypeus slightly incised. Antennæ black, dark testaceous on under side, thickish, attenuated at the apex. Wings hyaline; tegulæ black.

Length 4½ lines.

A stouter, broader insect than *tristis;* antennæ thicker and shorter, abdomen broader, more inflated, and otherwise is easily known by the broad, brown band surrounding the eyes. From the next species it may be recognised by the black pleuræ, by the four apical segments of abdomen being black at the sides and beneath, and by the larger, stouter body, and thicker antennæ.

The typical *fulviceps* differs from the form I have described in having the third to sixth segments "bright unspotted red," and the sternum pitchy. I have no doubt of the two being identical. Stephens' single specimen was from Bristol; mine from the south of England.

14. TENTHREDOPSIS LIVIDIVENTRIS.

Pl. XVII, fig. 7, Saw.

Tenthredopsis lividiventris, Cam., Tr. Ent. Soc., 1881, 568.

Black; labrum, clypeus, mandibles, orbits of the eyes broadly, edge of pronotum, tegulæ, scutellar spots white; an irregular splash on mesopleura and sternum, and the edge of abdomen above testaceous; sides and lower surface livid white. Legs testaceous; coxæ black, lined at the sides and below with livid white; trochanters pale; hinder femora for the greater part black above; apex of hinder tibiæ and tarsi fuscous. Wings hyaline; tegulæ white.

Length scarcely 4 lines.

Easily known by the livid abdomen, and by the pale splashes on sternum and pleuræ.

Not common. Mugdoch Wood, near Glasgow, early in June.

15. TENTHREDOPSIS ALBOMACULATA.

Pl. XVII, fig. 8, Saw.

Tenthredopsis albomaculatus, Cam., Tr. Ent. Soc., 1881, 569.

Head, with labrum, clypeus, mandibles, and orbits of eyes broadly white, the rest dull brown, save the sutures on vertex and the space surrounding the base of antennæ, all of which are black. Antennæ dull testaceous, darker above, especially at the apex, which is somewhat attenuated. Thorax black; a line on pronotum white; mesopleura with a broad white mark; metapleura lined with white; sternum for the greater part dull brown; sutures of mesonotum dull brown; scutellar

spots white. Abdomen dull testaceous, a broad black band on back, and a whitish transverse line at the base. Legs testaceous; coxæ black, broadly lined with white at sides and below; hinder tarsi and apex of tibiæ fuscous.
Length 4 lines.

This is a slightly larger insect than *lividiventris;* the brownish colour on head and thorax is much more extended, the marks on pleuræ are larger and clear white, antennæ paler, coxæ almost wholly white, and legs reddish without any black on them.
Rare. Rannoch in June.

16. TENTHREDOPSIS NIGRICEPS.

Pl. XVIII, fig. 1, Saw.

Tenthredopsis nigriceps, Cam., Tr. Ent. Soc., 1881, 569.

Dark rufescent; antennæ, head below the hinder ocellus, prothorax beneath, mesopleura behind, metathorax, the greater part of the four anterior coxæ, and all the trochanters deep black; scutellum, two spots behind, and cenchri yellow. The front tibiæ are paler than the rest of the legs; base of the middle femora and the greater part of the posterior femora and coxæ suffused with black; hinder knees black; posterior tarsi fuscous. Head and thorax covered with a close fuscous pubescence; sutures of mesonotum and parapsides black; labrum dirty white; palpi dark testaceous; cerci and apex of abdomen blackish. Antennæ attenuated at the apex, longer than the abdomen; the third joint distinctly longer than fourth; spurs on hind legs not reaching to middle of metatarsus. Wings hyaline; costa pale, except before stigma, where it is fuscous; tegulæ deep black.
Length nearly 4¾ lines.

The dark rufescent colour of body, and the black head and pleuræ, readily separate this species from all the luteous species of *Tenthredopsis.*
Seemingly rare. Salen, Mull; June.

17. TENTHREDOPSIS SAUNDERSI.

Pl. XVIII, fig. 2, Saw.

Tenthredopsis Saundersi, Cam., Tr. Ent. Soc., 1881, 570.

Dark testaceous; mandibles, labrum, clypeus, scutellum, and scutellar spots yellow; sides and lower part of thorax (save a dark testaceous splash on sternum), coxæ, trochanters, base of hinder femora, middle suture of mesonotum, metanotum, base and apex of abdomen, and a triangular mark in centre of intermediate segments, black; hinder tibiæ almost piceous, apex of tibiæ, and base and apex of tarsi blackish; second, third, and fourth joints white. Antennæ fuscous. Clypeus slightly incised; lateral sutures on vertex very deep, central one scarcely, if at all, indicated behind the ocelli, but it is very distinct, broad, and deep between the two outer ocelli, and has a transverse groove behind; the frontal space is not indicated, but the antennal fovea is very deep and wide. Wings hyaline, costa testaceous. Calcaria short, not reaching to middle of metatarsus.

Length 4 lines.

Similar to *nigriceps*, but differing in being smaller and narrower, in having the lower portion of the head the same colour as the upper, clypeus slightly incised at the apex, mesopleuræ and sternum black, spurs shorter, and the tarsi paler.

A single specimen in Shuckard's collection.

18. TENTHREDOPSIS DORSIVITTATA.

Pl. XVIII, fig. 3, Saw.

Tenthredopsis dorsivittatus, Cam., Tr. Ent. Soc., 1881, 570.

Luteous; labrum, clypeus, orbits of the eyes, a spot behind them, a line on pronotum, scutellar spots, and a line on basal segment of abdomen, bright yellow; sutures on pleuræ, metapleuræ, the greater part of metanotum and base of first abdominal segment, and a broad, usually more or less narrowed and interrupted on middle segments, band on the back of abdomen, with the sheath deep black; four front coxæ dark luteous, more or less black and white; hinder coxæ black, spotted with brown and white; trochanters pale, a black spot beneath, hinder tarsi with joints more or less fuscous. Wings hyaline.

Length 3¾—4½ lines.

A Scotch specimen has the antennæ entirely luteous, the black band on abdomen very faintly indicated, the tarsi scarcely fuscous, the space enclosing the ocelli and the middle suture on mesonotum black. An English specimen is much darker coloured, the black band on abdomen is represented on segments three to five by a triangular black mark on each, but the black extends all over the upper surface of basal and apical segments; the hinder tibiæ and apex of femora are fuscous, four apical joints of hinder tarsi pale, antennæ pitchy, and the metapleuræ are not altogether black.

A species intermediate between *inornata* and *nigriceps*. From the former it may be known by having the metapleuræ black, coxæ blacker, and (as well as the trochanters) more distinctly marked with white, antennæ and spurs longer; from the latter by its longer antennæ and spurs, lighter-coloured antennæ, luteous tegulæ, pale trochanters, and entirely luteous femora.

Apparently rare. I have it from Kingussie, have a specimen from the Manchester district, and have seen another in Shuckard's collection, while Mr. Bridgman takes it at Norwich.

19. TENTHREDOPSIS INORNATA.

Pl. XVIII, fig. 4, Saw.

Tenthredopsis inornatus, Cam., Tr. Ent. Soc., 1881, 571.

Dark testaceous; mandibles, clypeus, labrum, scutellum and scutellar spots yellow; back of abdomen with an interrupted black band; hinder tarsi fuscous, apical joints of antennæ fuscous; vertex in centre, coxæ, trochanters and hinder femora at base, and metapleuræ largely marked with black. The middle suture on vertex is absent; there is no distinct furrow between the ocelli, only a depressed space, frontal area depressed, antennal fovea wide. Wings hyaline.

The ♂ black; labrum, clypeus, and orbits of eyes broadly, and tegulæ and edge of pronotum yellowish-white; front coxæ with a white spot below, the rest and the posterior coxæ and base of femora black; trochanters pale. Legs and abdomen reddish, the latter with the apex and a band in the centre black.

Compared with *nassata* it is smaller, the antennæ are shorter and thicker in the middle, with the third joint longer in proportion to the fourth; the colour is darker, pubescence (especially on mesonotum) is much denser, hinder tarsi shorter in proportion to the tibiæ, and the wings shorter. *Nassata*, too, wants the black on legs and pleuræ, and the head projects more behind the eyes. *Sordida* may be known from it by its longer and thinner antennæ, the colour of the body is much brighter; the antennal fovea is deeper, but the frontal area is not so clearly indicated, the clypeus is more transverse at the apex, the base of legs always paler than the rest, and the pleuræ marked with yellow. *Dorsivittata* may be separated by the black metathorax and coxæ, by the band on abdomen being broader at the base and more distinct throughout, the band in *inornata* being not much more than a darkening in colour compared to the colour of the rest of abdomen.

Apparently rare. Bishopton on birch in June, Rannoch.

20. TENTHREDOPSIS NASSATA.

Pl. XVIII, fig. 5, Saw.

Tenthredo nassata, Lin., S. E., ed. xii, 926, 38, ♂; Fab., S. P., 59; Fall., Acta Holm., 1808, 116, 56 (♀); Lep., Mon., 84, 246; Ste., Ill., vii, 75, 5.
— *tiliæ*, Pz., F. G., Heft 91, pl. 13.
— *melanorrhœa*, Gmel., 136; Lep., F. Fr., pl. 4, fig. 4; Mon., 85, 248; Ste., Ill., vii, 75, 6.
— *instabilis, var. nassata*, Kl., Berl. Mag., viii, 197, 142; Htg., Blattw., 308, 37; Evers., Bull. Mosc., xx, 49, 22.
Perineura sordida, Thoms., Hym. Sc., i, 266, 3 (*ex parte*).
— *nassata*, Cam., Fauna, 14. 1; André, Species, i, 433, pl. xx, fig. 3; Cat., 52*, 6.
Tenthredopsis nassatus, Cam., Tr. Ent. Soc., 1881, 572.

Yellowish-testaceous; mouth, sometimes the inner orbits of the eyes, scutellum, two spots behind it, and cenchri, yellowish-white. Wings hyaline, stigma fuscous, with the basal half white; second transverse cubital nervure interstitial. Spurs reaching to near the middle of metatarsus.

The ♂ has the head clear yellow, except the vertex, which is black, thorax yellow, mesonotum black, except the scutellar spots, four anterior coxæ pale yellow, base of abdomen yellow, the rest of body and legs as in ♀, except that the hinder tarsi are paler, almost white. The last abdominal segment has, in the middle, a horse-shoe-shaped depression with a blunt carina in the centre. The basal joints of the antennæ are yellow, marked with black above.

Length 6—6½ lines.

Ab.—a. ♀. Abdomen marked with black above on the basal segments.

Ab.—b. ♂. Sutures of mesopleuræ lined with black.

Ab.—c. ♂. Sutures of mesonotum marked with yellow.

The largest of the testaceous species. Easily known by the long spurs and interstitial second recurrent nervure. Common in June. Clydesdale, New Galloway, Rannoch, Lochaweside, Mull, London district, Norwich.

Continental distribution: Sweden, Holland, Germany, France, Italy, Hungary, Russia.

21. TENTHREDOPSIS SORDIDA.

Pl. XVIII, fig. 6, Saw.

Tenthredo sordida, Klug, Berl. Mag., viii, 199, 143; Htg., Blattw., 308, 36; Evers., Bull. Mosc, xx, 49, 21.
Perineura sordida, Thoms., Hym. Sc., i, 266, 3 (*ex parte*); André, Species, i, 433, Cat., 53,* 9.
Tenthredopsis sordidus, Cam., Tr. Ent. Soc., 1881, 572.

Luteous; sparsely covered with a white pubescence, mandibles, labrum, clypeus, orbits of eyes, edge of pronotum, scutellar spots, bright yellow; abdomen with a broad, almost continuous, black band running down the back; coxæ pale yellow, marked with white at side; pleuræ marked with pale yellow at the juncture of the three divisions antennæ longish, slender, the apical joints marked with fuscous colour above, the third joint not much longer than fourth. Wings hyaline, nervures blackish, costa testaceous, stigma fuscous, white at base. Clypeus truncated at apex. Middle furrow on vertex distinct behind ocelli, and prolonged between them into a deeper channel; frontal area not well defined; antennal tubercles large, projecting.

♂ black; mouth, orbits, tegulæ, pronotum, a broad band on pleuræ, and the greater part of the coxæ, white; hind tibiæ and femora more or less fuscous-black; abdomen reddish-testaceous, black in the centre above; anal segment with two deep foveæ.

Length 3¾—4¼ lines.

The smallest of the yellow species. The colour is paler than in *nassata* or *inornata*, the head has the yellow brighter and wider round the eyes, the coxæ and trochanters pale yellow, marked with white, while in *nassata* they are of the same colour as the body, and in *inornata* darker and marked with black. The sutures on thorax are also pale yellow, and the back of abdomen is, except very rarely, broadly black.

Commonly distributed in Scotland, appearing in June.

Continental distribution : Sweden, Holland, France, Germany, Switzerland, Hungary, Tyrol, Italy, Russia.

Genus—SYNÆREMA.

Synairema, Htg., Blattw., 1837, 314, ♂.
Perineura, Htg., *l. c.* 303, ♀.

Wings : lanceolate cellule contracted in the middle. In the ♂ the transverse nervures are all produced along the edge of the wing so as to form a surrounding border. The ♀ has two middle cellules.

Antennæ long, filiform, the third joint nearly of the same length as the fourth.

Abdomen with a large distinct blotch. Body smooth, shining; thorax with white markings.

Clypeus with a deep triangular incision in the middle. Labrum large, rounded at the apex. Mandibles small. Eyes small, parallel, not touching the base of the mandibles.

Legs short. Frontal sutures and parapsides distinct.

Of this genus only three species are known, and it is doubtful if these are all distinct. I am not aware of any forms being known out of Europe.

From *Tenthredopsis*, *Synærema* is readily known, by the deeply increased clypeus, distinct blotch, and contracted lanceolate cellule.

Obs.—Hartig formed the genus *Perineura* for the ♂ of the *Tenthredo rubi*, Pz., and for the ♀ he created another genus, *Synærema*. Thomson utilises the name *Perineura* for the *instabilis* group and some other species (as already explained), while he retains *Synærema* for *rubi*. As, however, Costa formed a genus for the *instabilis* group, the name *Perineura* must sink. I have used *Synærema* in preference, because it has been correctly defined by Thomson, and further, the ♀ as a whole affords the most reliable characters, the same neuration of the posterior wing in the ♂ being found in *Tenthredopsis*.

SYNÆREMA RUBI.

Pl. VIII, fig. 10, ♂, 10 *a* antennæ.

Tenthredo rubi, Pz., F. G., xci, fig. 14; Klug., Berl. Mag., viii, 50, 11; Lep., Mon., 111, 320; Ste., Ill., vii, 75, 7.
— (*Perineura*) *rubi*, Htg., Blattw., 303, 16.
— *lividiventris*, Fall., Acta 1808, 117.
— *elegantula*, Fall., l. c.
— *delicatula*, Klug, Berl. Mag., viii, 188, 129.
Synærema delicatula, Htg., Blattw., 314, 62.
— *rubi*, Thoms., Opus., 300, 1; Hym., Scand., i, 264, 1; Cam., Fauna, 15, 1; André, Species, i, 414; Cat., 52,* 1.

♂. Antennæ thick, nearly as long as the body, reddish, the two basal joints black. Head black, clypeus, epistoma, labrum, mandibles (except the tips, which are brownish), inner orbits of the eyes, broadly in front and narrowly behind, and the sides of head behind yellowish-white. Thorax black, shining, two spots on centre of mesonotum, the greater part of pleuræ and scutellum, a triangular spot behind and the cenchri yellowish-white. Abdomen yellowish. Legs reddish, white at the base. Wings hyaline, costa and stigma testaceous-white.

The ♀ I have never seen. According to Thomson it has the three apical joints of antennæ white, the labrum, apex of clypeus, inner orbits of the eyes, a transverse mark on vertex, edge of pronotum, tegulæ, posterior parapsides, scutellum, a line on the pleuræ and legs sordid white; the coxæ black at the base, posterior tarsi and the femora nearly all blackish-fuscous; abdomen livid red in the middle and on the belly at the apical portion of the segments. Stigma fuscous, pale at the base.

Length nearly four lines.

Seemingly rare. I have taken in July two males at Cadder Wilderness.

It occurs in Scandinavia, Germany, Holland, Belgium, and France, but seems to be rare everywhere.

Genus—PACHYPROTASIS.

Pachyprotasis, Htg., Blattw., 295.

Wings with two radial and four cubital cellules; lanceolate cellule shortly contracted. Hind wing with the transverse cubital, and recurrent nervures present. Antennæ much longer than the head and thorax, filiform, of nearly equal thickness, fourth joint not much shorter than the third. Eyes almost parallel, not reaching to the base of the mandibles; clypeus incised. Mandibles with three sub-apical teeth.

Pachyprotasis and *Macrophya* agree together in certain points of structure which separate them from the other genera in the sub-family. They agree in the large size of the hind coxæ, which reach or go beyond the third abdominal segment, in the long hind legs and spurs, and generally in the neuration of the wings, which have the lanceolate cellule usually shortly contracted. They agree, too, in having the body (as a rule) smooth, shining, and unpunctured, as well as in coloration; but they differ in three important points: *Pachyprotasis* has the antennæ long and filiform, never fusiform nor thickened; while the third joint is only a little longer than the fourth; the eyes on the inner sides are parallel, not converging, and do not reach to the base of the mandibles; and the pleuræ and sternum are variegated to a large extent with white or yellow.

The larvæ, so far as is known, are green, and feed on trees or herbaceous plants. The species are more northern in their distribution than those of *Macrophya*, but otherwise have pretty much the same geographical range. Six, if not seven, species are European, one or two are described from India and Japan, and the genus also occurs in North America.

Synopsis of Species.

1 (6) Legs white or yellow, lined with black.
2 (5) Pleuræ marked with black.
3 (4) Head and thorax with white markings, punctured, pilose; abdominal segments scarcely bordered with white. *Rapæ.*
4 (3) Head and thorax with yellowish-white markings, smooth, glabrous, unpunctured; abdominal segments broadly bordered with yellowish-white. *Simulans.*
5 (2) Pleuræ entirely yellow; head and thorax with yellow markings; hind tibiæ with a yellow ring at the apex. *Antennata.*
6 (1) Legs red and white, lined with black; pleuræ marked with black. *Variegata.*

1. Pachyprotasis rapæ.

Pl. IX, fig. 2, Saw.; Pl. VI, figs. 1 and 1*a*, Larva.

Tenthredo rapæ, Lin., S. N., ed. xii, 926, 35; Schr., En., 336, 676 Vill., Lin. Ent., 45; Rossi, Mant., 242; Fab., E. S., ii, 114, 35; S. P., 41, 56; Fall., Acta, 1808, 99, 30, 1; Klug, Berl. Mag., viii, 127, 96; Ste., Ill., vii, 73, 1; Htg., Blattw., 296, 19; Evers., Bull. Mosc., xx, 43, 12.

Pachyprotasis rapæ, Thoms., Opus., 284, 1; Hym. Scand., i, 248, 1; Cam., Fauna, 15, 1; André, Species, i, 341; Cat., 43,* 5.

Head and thorax faintly punctured; head behind vertex, thorax, and adomen above black; orbits of the eyes, lower parts of the head, a V-shaped mark on the mesonotum, a minute spot behind it; scutellum, a spot on post-scutellum, and the lower part and sides of the body white; pleuræ and the edges of sternum largely marked with black; abdominal segments variegated with black. Legs white, a mark on coxæ, the apical half of all the femora and the hinder pair also at the sides, tibiæ and four anterior tarsi above, and the whole of the posterior tarsi black. Wings hyaline, costa and stigma fuscous-black. The tegulæ are black. The ♂ has the antennæ longer than the body.
Length 3—4 lines.

Some specimens have the white markings much less and the black ones on the pleuræ and sternum larger than in others, while, again, in rare cases, the former are much larger and the latter less, and the abdominal segments faintly lined with white on the back.

The larva has the upper half of the body dull greyish-brown, darker at the junction with the lower white half; a brownish stripe is over each leg; claws brown. Upper part of the head faintly brownish, varying in intensity; a black band goes across the middle of the face from behind the eye spots, where it is broader and darker in tint; over the mouth the head is paler, almost white; mandibles black; a few scattered hairs on the head. The skin is wrinkled, almost bare; the anal segment has a few hairs.

At the last moult the body becomes dark green, a lighter and brighter green below the spiracles, a white stripe is at the junction of the two colours. Head light green, light brownish on vertex, eye spots black, mouth brownish, a light brownish band over face, and a dark oblique spot over legs; claws brown, spiracles pale. The anal segment is whitish, and bears a few hairs, while over it is a light blackish mark.

The larva was discovered by Mr. Fletcher feeding on *Scrophularia aquatica* and *Stachys betonica*. In Clydesdale it frequents mostly *Verbascum thapsus* and *Pedicularis* in the autumn. It pupates in the earth.

An extremely abundant species, found everywhere in June and the early part of July.

Its Continent distribution extends from Lapland to the Mediterranean, and eastward to the Ural Mountains and India (*cf.* Cameron, Trans. Ent. Soc., 1877, 88). Apparently, too, *P. omega*, Norton, a widely distributed form in North America, is the same species.

2. PACHYPROTASIS SIMULANS.

Tenthredo simulans, Klug, Berl. Mag., viii, 128, 97; Htg., Blattw., 296, 20; Ste., Ill., vii, 73, 2 (*nec* type).
Pachyprotasis lævicollis, Thoms., Hym. Scand., i, 249, 2.
— *simulans*, André, Species, i, 340; Cat., 43,* 6.

Black, smooth, shining; the face from the antennal fovea, inner and outer orbits of the eyes to a little above the insertion of the antennæ, tegulæ, suture of middle lobe of mesonotum, a small square spot in front of scutellum, scutellum, two spots behind it, breast, a broad band along the middle of mesopleura, hinder edge of metapleura going down from the wings, sides of abdomen, belly, a broad band at the junction of the segments on the back (the anterior spreading out so as to divide the black portion in the middle, so that the middle of the abdomen is yellow with longish black marks along the sides), yellowish-white. Legs yellowish-white, a mark on upper and lower side of coxæ, a broad line over the trochanters and femora, and four anterior tibiæ and tarsi, the greater part of the posterior tibiæ and tarsi, black. Hinder tibiæ variegated with white in the middle; base of metatarsus and spurs white. Antennæ longer than the body, yellowish-white on underside. Wings hyaline, nervures, costa, and stigma black. ♂.

Length 4 lines.

Differs from *rapæ* in the smooth, impunctate, almost glabrous front and mesonotum, and by the greater extension of the white on the abdomen. The ♂ has the antennæ longer and with a denser pile than in *rapæ*.

The larva is described by Kaltenbach (Pfl., 431). It is 9‴ long; the head is orange-yellow, body olive green, with small white points; on the sides and belly the colour is dirty white, while on the inner side of each segment there are two green spots, one under the other. It feeds in September on low growing ash trees (*Fraxinus*), eating along the edge and underside of the leaf.

Rare. I have only seen one ♂ from Norwich (J. B. Bridgman).

Continental distribution: Sweden, France, Tyrol, Austria.

3. PACHYPROTASIS ANTENNATA.

Pl. IX, fig. 1 ♂; 1 *a*, antennæ; 1 *b*, leg; 1 *c* and 1 *d*, trophi; 1 *e*, saw.

Tenthredo antennata, Klug, Berl. Mag., viii, 128, 98; Ste., Ill., vii, 74, 3; Htg., Blattw., 296, 21.
— *duplex*, Lep., Mon., 87, 251.
Pachyprotasis antennata, Thoms., Opus., 294, 3; Hym. Scand., i, 250, 4; Cam., Fauna, 15, 3; André, Species, i, 340, pl. xix, fig. 1; Cat., 43,*3.

Vertex, head behind, thorax and abdomen above, black; abdomen with a faint bronzy tint; inner orbits of the eyes, lower parts of the head, sides and under side of the thorax and abdomen, and some marks on mesonotum (as in *rapæ*), yellowish-white. Legs yellowish-white; a line on the upper side of the four anterior femora at the apex, and on each side of the posterior, and a line above the tibiæ and tarsi, black; apex of posterior tibiæ and tarsi entirely black, the hinder tibiæ having a yellowish ring before the black apical part; hinder calcaria pale at the base. Wings hyaline, costa and stigma blackish-fuscous, tegulæ white in front. Vertex faintly punctured.

The ♂ has the antennæ pale on the lower side and as long as the body; there is a small, oblique, black stripe on the mesosternum, and another on the hind coxæ, but these may be absent.

Length 4—4¼ lines.

Antennata is a common but not very generally distributed species. It is not rare in the Glasgow district, in Sutherlandshire, Rannoch, Braemar, Kingussie; also about London, at Glanvilles' Wootton, Devonshire, Manchester. It appears from the beginning of June to the beginning of July.

Continental distribution: Scandinavia, Germany, France, Holland, Tyrol.

4. PACHYPROTASIS VARIEGATA.

Tenthredo variegata, Klug, Berl. Mag., viii, 129, 99; Ste., Ill., vii, 74, 4, pl. 38, fig. 3; Htg., Blattw., 296, 22.

Pachyprotasis variegata, Thoms., Opus., 294, 2; Hym., Scand., i, 249, 3; Cam., Fauna., 15, 2; André, Species, i, 339; Cat., 43*, 2.

Black, smooth, shining; head (except behind and a large spot on vertex), pleuræ, sternum, abdomen beneath, and some spots on the mesonotum, white; the upper sides of the pleuræ, and a large spot on the edge of the sternum, black. Legs: all the femora and the hinder tibiæ red, four anterior tibiæ and tarsi, white in front, black behind; apex of posterior tibiæ and tarsi black; coxæ and trochanters white. There is a thin black line above the first pair of femora. The base of the hinder tarsi and the calcaria reddish. The margins of the dorsal abdominal segments are white, the sides and belly are faintly variegated with black. Wings hyaline, costa and stigma fuscous. ♀.

Length 4—4½ lines.

This species is readily separated from all the other species by the reddish legs.

It is not very common. I have taken it in Rannoch, Kingussie, and Glen Urquhart. Stephens records it from Darenth Wood and Devonshire.

Continental distribution: Sweden, Germany, Holland and France.

Genus—MACROPHYA.

Macrophya, Dbm., Comp., 4.

Wings with two radial and four cubital cellules, the second and third of the latter receiving each a recurrent nervure. Lanceolate cellule with a short transverse nervure, or shortly contracted. Transverse cubital and recurrent nervures in hind wings present. Antennæ short, not much longer than the head and thorax, thickened from the fourth joint, and sometimes fusiform; third joint about double the length of fourth. Legs long, hind coxæ large, reaching to the third abdominal segment; hind calcaria reaching beyond the middle of the metatarsus. Clypeus deeply incised at the apex; eyes converging on the inner side, and reaching to the base of mandibles.

The body is cylindrical, appearing short and thickset owing to the great length of the legs. With most species the lanceolate cellule is shortly contracted, but with *blanda*, *neglecta*, and *crassula*, Klug, there is a very short straight cross nervure. *M. sturmi*, Klug, again, has an oblique cross nervure. The form of the cellule, however, varies in the same species as, *e.g.* in *M. ribis*; that is to say, the contraction may be longer or shorter. Mostly there are two median cellules in the hind wing, but in *M. carinthiaca*, Kl., there is only one.

The ground colour is generally black, with the legs, thorax, and abdomen variegated with white, red, or yellow, or all three. The sexes not unfrequently differ in coloration, as, for instance, in *hæmatopus* and *dumetorum*, which have the four front legs yellow in the ♂ instead of red as in the ♀; or, as in *rustica*, which has the hind legs quite black in the ♂ and black and yellow in the ♀.

The species are commoner in southern than in northern Europe, being especially common along the Mediterranean. Eastward they extend into Japan and into the Oriental region as far south as southern India. They are not uncommon in the Nearctic region, thirty-eight species being included in Cresson's catalogue. There are close on fifty European species.

Synopsis of Species.

1 (10) Legs black and white, abdomen marked with yellow or white.
2 (3) Four anterior legs white. *Rustica.*
3 (2) Four anterior legs for the greater part black.
4 (5) Stigma testaceous. 12-*Punctata.*
5 (4) Stigma black.
6 (9) Abdomen and pronotum with white markings, scutellum faintly punctured.
7 (8) Vertex, scutellum, and coxæ with white markings, sides of abdomen black, tegulæ partly black, ♂ with the apex of abdomen black beneath. *Albicincta.*
8 (7) Scutellum and coxæ black, pleuræ and abdomen marked with white, tegulæ white, ♂ with the apex of abdomen white beneath. *Albipuncta.*
9 (6) Abdomen and pronotum without white markings, scutellum strongly punctured. *Ribis.*
10 (13) Legs black, abdomen with a red band and a membranous white spot over posterior coxæ.
11 (12) Posterior coxæ with a large white mark, mouth more or less white. *Blanda.*
12 (11) Posterior coxæ without a white mark, mouth black. *Neglecta.*
13 (10) Legs reddish.
14 (15) Abdomen with a red band. *Rufipes.*

15 (14) Abdomen without a red band.
16 (17) Mouth white, pronotum black. *Hæmatopus.*
17 (16) Mouth black, pronotum yellowish-white. *Punctum-album.*

Lanceolate cellule with a short, straight nervure, wings hyaline, infuscated at the apex, stigma black. Thorax strongly punctured, scutellum gibbose. Clypeus and labrum convex. Abdomen black with a broad red band. Legs black. Transverse medial nervure received close to basal (Species 1 and 2).

1. MACROPHYA BLANDA.

Tenthredo blanda, Fab., E. S., ii, 119, 59; S. P., 36, 35; Pz., F. G., lii, 9; lxv, 9; Klug, Berl. Mag., viii, 111, 76; Lep., Mon., 98, 277; Htg., Blattw., 292, 2.
— *ligustrina*, Fourc., E. P., ii, 24.
— *cylindrica*, Fab., S. P., 32, 16; Pz., F. G., lxxi, fig. 7; Spin., Ins. Lig., i, 56.
— *cognata*, Fall., Mon., 48, 17.
— *lacrymosa*, Lep., F. Fr., pl. 6, fig. 7; Mon., 101, 285.
Allantus blandus, Ste., Ill., vii, 63, 17.
Macrophya blanda, Evers., Bull. Mosc., xx, 40, 1; Tasch., Hym., 14; Thoms., Opus., 295, 1; Hym., Scand., i, 251, 1; André, Species, i, 343; Cat., 46,* 38.
— — var. *brevicornis*, Gradl, Ent. Nacht., 1878, 239.

Black, mouth at the side, apex of labrum, apex of two anterior femora and tibiæ in front, and a large spot on the posterior coxæ white; the third to the fifth abdominal segments red. Head and thorax opaque, almost glabrous, strongly punctured. Wings almost hyaline, with a faint smoky tinge at the apex; costa and stigma sordid-fuscous; the lower part of the latter being paler than the upper.

The ♂ has the whole of the mouth, the entire anterior tarsi, femora, and tibiæ in front, basal half of hind femora beneath, and coxæ at the apex, whitish. The red abdominal band is very much narrower and rarely encircles the whole body.

Length 6—6¾ lines.

Ab.—*a.* Abdomen entirely black.

Mr. F. Smith tells me that this is a common species in the west of England. It is taken by Mr. Dale at Glanvilles' Wootton, and according to Stephens is common in the London districts. Norwich (Mr. Bridgman).

It is of wide European distribution, being found in Sweden, Prussia, South Germany, Hungary, France, Switzerland, Italy, and Russia.

2. MACROPHYA NEGLECTA.

Tenthredo neglecta, Klug, Berl. Mag., viii, 112, 77; Htg., Blattw., 292, 3.
— *blanda*, Schaef., Icon., vii, fig. 5; Fall., Mon., 47, 16.
— *Schaefferi*, Lep., F. Fr., pl. 6, fig. 4; Mon., 98, 276.
Allantus neglectus, Ste., Ill., vii, 63, 18.
Macrophya neglecta, Evers., Bull. Mosc., xx, 40, 2; Tasch, Hymen., 14; Thoms., Opus., 295, 2; Hym. Scand., i, 251, 2; André, Species, i, 367; Cat., 46,* 39.

Black; the second to sixth abdominal segments red; the anterior femora and tibiæ white in front. ♀ and ♂.
Length 5½—6½.

Very like the last species, but smaller, the mesonotum and head scarcely so strongly punctured; mouth black; the red band on the abdomen broader. There is no mark over the posterior coxæ, while the wings are darker and the antennæ, if anything, shorter.

A common species in the midland and southern counties of England.

It has the same European distribution as *blanda*, but is much commoner. Nothing is known regarding the earlier stages of these two species.

Lanceolate cellule subcontracted; costa and stigma yellowish. Abdomen with white markings on sides and anus. Legs with white on tibiæ and tarsi, the rest black; a white membranous spot over hind coxæ; scutellum convex (Species 3).

3. MACROPHYA 12-PUNCTATA.

Tenthredo 12-punctata, Lin., S. N., Ed., x, 558, 25; F. S., 1559; Fall., Acta, 1808, 101, 32; Pz., F. G., lii, fig. 8; Fab., E. S., ii, 119, 56; S. P., 36, 32; Rossi., F. E., 724; Spin., Ins. Lig., i, 57, 14; Klug, Berl. Mag., viii, 122, 91; Lep., Mon., 100, 282; Htg., Blattw., 294, 13.
— *fera*, Fab., S. P., 38; Coqueb., Icon., Tab., 3, fig. 7 Lep., Mon., 242, 82.
Allantus 12-punctatus, Ste., Ill., vii, 61, 10.
— *ferus*, Ste., Ill., vii, 61, 11.

Macrophya 12-*punctata*, Evers., Bull. Mosc., xx, 42, 10; Tasch., Hym., 15; Thoms., Opus., 296, 6; Hym. Scand., i, 252, 3; André, Species, i, 351; Cat., 44,* 19.

Black, shining; vertex and mesonotum almost glabrous, punctured labrum, clypeus, edge of pronotum, scutellum, a large spot over posterior coxæ, a spot on the side of the fourth, fifth, and sixth abdominal segments, one over the anal segment, and the greater part of the tibiæ at the side, white. Tegulæ black; cenchri pale white. Wings subhyaline, fuscous at the apex, nervures, costa and stigma sordid yellow.

The ♂ has the mouth, scutellum, abdomen and posterior tibiæ (except a very narrow ring) black; there is only a small white spot at the base of pronotum, the costa is fuscous, stigma sordid-testaceous, and the wings want the yellowish tinge, while the white lateral markings on the abdomen are very faint. The mouth and posterior tibiæ have, occasionally, as much white as in the ♀.

Length 4—5¼ lines.

From the succeeding species 12-*punctata* is easily separated by the colour of the alar nervures, legs and abdomen.

The larva, according to André, feeds on the alder in July and August. It has a greenish-yellow body, striated transversely; the head smooth, green, with brown eye spots.

Common in Dunham Park, near Manchester, Gloucester, Worcester, Glanvilles' Wootton, and in the metropolitan district.

Continental distribution: Sweden, Holland, Switzerland, France, Germany, Hungary, Russia.

Wings infuscated at the apex, costa and stigma black. Legs with white at base, and on tibiæ and tarsi. Abdomen with white markings on sides, base and apex, or quite black. Thorax smooth, shining, or strongly punctured. Lanceolate cellule sub-contracted, or with a short, straight nervure (Species 4 to 6).

4. MACROPHYA ALBICINCTA.

Tenthredo albicincta, Schr., En., 329, 661; Klug, Berl. Mag., viii, 129, 94; Lep., Mon., 103, 291; Htg., Blattw., 295, 14.
— *fera*, Fall., Acta Holm., 1808, 102, 33.
— *luctuosa*, Lep., Mon., 103, 290.
Allantus albicinctus, Ste., Ill., vii, 61, 12.

Macrophya albicincta, Tasch., Hym., 15; Voll., Tidj. Ent., i (2), 189—195, pl. 7 (lar.); Ent., vi, 43; Kalt., Pfl., 298; Cam., E. M. M., xiv, 265; Fauna, 15; André, Species, i, 354, pl. xxx, fig. 4; Cat., 46,* 34.

— *ribis* Thoms., Opus., 295, 4; Hym. Scand., i, 253, 6.

Black, shining; head and thorax covered with a pale pile, clypeus, except at the extreme base; the greater part of the labrum in front and at the sides, a mark at base of mandibles, two small dots behind the ocelli, pronotum, tegulæ in front, the greater part of the scutellum, the apical fourth of the two anterior femora and tibiæ, except at the extreme apex; basal joint of the tarsi in front, apex of four posterior femora, the greater part of hind tibiæ in the middle, posterior trochanters, base of femora and apex of coxæ, a faint spot over anal segment, a large oblong spot over the hind coxæ, and the blotch white.

The antennæ are somewhat longer than the abdomen, the middle joints being thickened; on the pleuræ are scattered punctures; they are almost shining and faintly pilose; the scutellum is smooth, shining, vertex slightly contracted, sheath of saw projecting, pilose at the apex; palpi annulated with fuscous-white, and the hinder tarsi are quite black. Wings hyaline at the base, smoky at the apex. The nervure in the lanceolate cellule varies in form, it being sometimes shorter, at other times longer contracted.

In the ♂ the antennæ are longer and thicker, the joints being also more closely compressed together; clypeus and labrum almost wholly white; anterior legs have more white in front; white band on posterior tibiæ smaller; the anal lobes are white, and so also are the posterior abdominal segments at the side. The scutellum is black.

Length 4—5 lines.

Ab.—*a.* Scutellum black (♀).

The amount of white on the mouth, legs, &c., varies in intensity in both sexes.

The larva has been described by Van Vollenhoven and Kaltenbach. The former naturalist observed the ♀ on the 8th of April, about half past eleven (the thermometer being at 60° F.), flying about wildly around an elder bush and settling occasionally on the leaves. This specimen he caught and placed in a glass along with a branch of elder. When in the shade it remained very quiet and even fell and lay upon its back, but when the glass was placed again in the sunshine it revived; at first it moved the antennæ violently, and then commenced to run rapidly about. By 4 o'clock it had laid twelve eggs in little receptacles in the leaves embedded in the lower epidermis. The egg is bean-shaped, pearly white, rather flat on one side, the skin being very thin.

The larva has a sordid greenish-yellow head, with a quadrate, shining black spot on the vertex, and two large round similar spots on the sides, in which the eyes are placed, mouth brownish; head both above and below shortly and sparsely hirsute. In the younger larvæ the body is a sordid yellow, with three brown-green stripes, the outer of which are darker than the inner one; the spiracles pale yellow; above them are some black lines, and below, just over the legs, is a dark transverse line. Above the anus is a small black spot. The three dorsal lines have the appearance of being ribbed, the inner side of the numerous folds of the skin being of a pale tint. The thoracic legs are pale yellow, with black lines on the first or thickest joint. The claws are pale brown. The ventral surface, as also the posterior legs, are pale, without spots, and the caudal end is beset with short white hairs.

When full fed there are two dark grey triangular marks over each leg. The black spots over the spiracles become larger, and the edges of the stigmata very pale brown. Over each proleg are two oblique blackish spots, and there is a triangular spot over the anus of the same colour.

After the last moult the head is reddish and the body entirely of a very pale greenish-grey colour; the three dorsal lines being darker than the ground colour. The black points on the sides disappear.

During the day the larvæ remain reposing on the underside of the leaves. In the evening they commence to feed, eating large holes in the leaves; they do not invariably commence to feed along the margin, but frequently eat holes out of the middle.

The larvæ are found in June and July, and spin their cocoons in the earth, emerging from them in the winged state in the following spring.

In Britain, *albicincta* is perhaps the commonest and most widely distributed of the genus, being found almost everywhere from Sutherlandshire to the South of England.

Continental distribution: Scandinavia, Germany, Holland, France, Switzerland, Tyrol, Italy, Hungary.

5. MACROPHYA ALBIPUNCTA.

Pl. VIII, fig. 12, ♀.

Tenthredo albipuncta, Fall., Acta, 1808, 104, 37.
Macrophya — Thoms., Opus., 295, 5; Hym. Scand., i, 254, 8; Cam., E. M. M., xiv, 265; Fauna, 15; André, Species, i, 362; Cat., 46,* 35.

Black, variegated with white. Antennæ scarcely longer than the abdomen, the fourth to eighth joints thickened, third nearly double the length of fourth. Head shining, covered with a short pile; palpi, clypeus, and labrum clear white, clypeus deeply incised. Thorax with a very short pubescence, tegulæ, pronotum, and a narrow stripe on the pleuræ white. Abdomen roundish, not longer than the head and thorax, the segments at the sides and a large spot over anus white. Legs with the apex of coxæ, trochanters, and base of femora, apex of four anterior femora and tibiæ in front, posterior knees and femora, except at the extreme base and apex, white. Wings hyaline, costa fuscous, the stigma in the middle sordid-testaceous.

In the ♂ the anterior legs bear more of the white colour, being entirely white in front, and the posterior femora are lined with white below; posterior tibiæ are lined throughout with a black streak; ventral segments below and the anal lobes white. In the only specimen of this sex that I have seen, the transverse radial nervure is almost interstitial.

Length 3½—4 lines.

Compared with *albicincta*, the present species is smaller and has the head and thorax less pilose; the scutellum is black, slightly truncated and less convex; there are no marks on the vertex, the mouth and tegulæ are white, antennæ short, and otherwise it is readily separated by the marks on the pleuræ. The ♂ is easily known by the white ventral segments.

Ab.—*a.* Basal joint of posterior tarsus white (♀).

Albipuncta is not common. I have seen three specimens only; one from Rannoch, one from Muchalls, Aberdeenshire (Trail), and another from Dalry (Sharp). Mr. Bridgman records it from Norwich.

On the Continent it has only been recorded from Scandinavia and Germany.

Obs.—Thomson quotes *Macrophya crassula*, Kl., as a synonym of *albipuncta*, but this is a mistake, Klug's species is larger; the markings are yellowish, the mark on the pleuræ is larger, pronotum broadly marked with yellowish-white, the hinder tibiæ are not black at the base, the stigma is not testaceous, the second recurrent is almost interstitial, while it is received with *albipuncta* near the middle of the cellule.

Thomson describes *albipuncta* as having the lanceolate cellule uncontracted, but this is really a character of no value, since in my specimens the form of this cellule is not quite the same in any of them.

Macrophya carinthiaca, Kl., forms a section with only a single cellule in the posterior wing.

6. MACROPHYA RIBIS.

Tenthredo ribis, Schr., En., 332, 668; Fab., S. P., 30, 8; Pz., F. G., lii, fig. 12; Spin., Ins. Lig., i, 55, 5; Klug, Berl. Mag., viii, 126, 95; Lep., Mon., 104, 293; Htg., Blattw., 291, 11.
— *leucopus*, Gmel., S. N., 2666, 118.
Allantus ribis, Ste., Ill., vii, 62, 13.
Macrophya ribis, Tasch., Hym., 15; Kalt., Pfl., 298 (Script *ribesii*); Cam., E. M. M., xiv, 265; André, Species, i, 344; Cat., 46,* 37.
— *albicincta*. Thoms., Opus., 296, 17; Hym. Scand., i, 254, 7.

Antennæ stout, a little longer than the head and thorax, not tapering much towards the apex; black, covered with a very short microscopic down. Head black, densely covered with a longish grey pile, punctured, clypeus deeply notched, almost to the base; vertex raised; the clypeus at the base on each side, a spot on the labrum in front, mandibles at the sides and palpi (faintly) white. Thorax covered with a longish scattered grey pile. Mesonotum punctured, the lobes deep, especially that in front of scutellum, which is raised and very deeply punctured; cenchri white; pleuræ semi-opaque, punctured. Abdomen longer than the head and thorax. Legs black, a narrow spot on the side of each of the four anterior coxæ, a large pyriform one on the posterior, trochanters, apical fourth of four anterior femora and tibiæ entirely in front (except at the extreme apex where the colour is black), and a ring near the apex, tarsal joints more or less in the middle; apex of posterior coxæ, trochanters, base and apex of femora, apical third of tibiæ (except at the extreme apex), and the apical joints of the tarsi more or less white. The calcaria are black and reach near to the middle of the metatarsus. Wings subhyaline, slightly brownish at the apex.

The ♂ has the clypeus and labrum for the greater part white; anterior legs almost entirely white in front, as well as the posterior coxæ, trochanters, and base of femora. The apical part of abdomen is marked with white below.

Length 4½ lines.

From the allied species, *Ribis* is distinguished by the blackish clypeus (in the ♀) and pronotum, immaculate and strongly punctured scutellum, the abdomen without white markings, and its generally dull and less shining colour. The amount of white on legs and mouth parts varies.

Personally I know nothing about the history of this species, and what has been written about it is rather conflicting. Schranck describes the larva as green with a rugose body with two minute black dots on the vertex, and feeding on *Ribis*. Dours (Cat. Syn., p. 22) states that the larva lives on the gooseberry, and has for parasites *Pygostolus sticticus*, Hal., and *Mesoleius armillatorius*, Gr.=*luteifrous*, Gr. (according to Goureau). Kaltenbach, on the other hand, says that it is suspected to have a similar history to *albicincta*. The larva he describes as very like the latter, the head orange-yellow with a black mark on vertex and anus, and without any lateral markings.

In Britain *ribis* is confined to the South of England. Stephens says it occurs in Darenth Wood. It is taken at Glanvilles' Wootton by Mr. Dale, and at Norwich by Mr. Bridgman.

It is met with in Sweden, Holland, Germany (in gardens according to Hartig), Prussia, France, Italy, Switzerland.

Lanceolate cellule shortly contracted; transverse median nervure received close to basal. Legs yellowish-white, posterior femora, tibiæ and tarsi marked with black; abdomen with white markings at base, sides, and apex; thorax strongly punctured; wings hyaline, darkened at apex, stigma black (Species 7).

7. MACROPHYA RUSTICA.

Tenthredo rustica, Lin., S. N., ed. xii, 923, 16; Fab., E. S., ii, 118, 52; S. P., 30, 6; Schr., En., 324, 653; Rossi, F. E., 719; Klug, Berl. Mag., viii, 119, 88; Lep., F. Fr., pl. 5, fig. 6, pl. 7, fig. 2; Mon., 94, 267; Htg., Blattw., 294, 11.

Tenthredo notata, Pz., F. G., lxiv, fig. 10.
— *carbonaria*, Fab., E. S., ii, 120, 63; S. P., 307; Pz., l. c., fig. 10.
— *sulphurata*, Gmel., S. N. V., 2665.
Allantus rusticus, Ste., Ill., vii, 60, 9.
Macrophya rustica, Evers., Bull. Mosc., xx, 41, 7; Tasch., Hym., 15; Thoms., Opus., 295, 3; Hym. Scand., i, 252, 4; André, Species, i, 3, 43, pl. xix, figs. 2, 6, 7; Cat., 43, *5.

Black; labrum, clypeus, and palpi partly white; tegulæ, pronotum, a band (narrowed in the centre) on the fourth segment, a fascia on the fifth and sixth, a smaller one lower down on the seventh, and a ring surrounding the last segment above, four anterior legs (except base of coxæ and tarsi), apex of posterior coxæ, trochanters, basal three-fourths of femora, and a line a little below the middle of the tibiæ yellow. The apex of anterior tibiæ and the tarsi are marked with black; anterior spurs yellow, posterior black. Wings subhyaline, the apical third suffused with a fuscous tint, costa and stigma fuscous. The head and thorax have a griseous pile; clypeus is only slightly emarginate, pleuræ and mesonotum are punctured, antennæ subclavate.

The ♂ has the pronotum and abdomen immaculate; there is a small white spot on the outside of the posterior tibiæ, the second to fourth joints of hind tarsi are white, and the hind coxæ have more yellow on them.

Length 5¼—5¾ lines.

Ab.—*a.* Scutellum marked with yellow.

The thickish body and the disposition and colour of the markings will readily serve to distinguish *rustica* from the other British species.

It is a common species in the south and south-western districts of England, and is found also in Clydesdale although rarely.

Common in Scandinavia, Prussia, South Germany, Holland, Hungary, France, Spain, Switzerland, Italy, Russia, Greece.

Legs red, hinder femora without a white band; abdomen with white markings. Mouth white; clypeus deeply incised. Lanceolate cellule contracted in the middle (Species 8 and 9).

8. MACROPHYA HÆMATOPUS.

Tenthredo hæmatopus, Pz., F. G., lxxxi, figs. 11 and 12; Fab., S. P., 36, 37; Spin., Ins. Lig. i, 58; Klug, Berl. Mag., viii, 116, 84; Lep., Mon., 100, 281; Htg., Blattw., 293, 7.
— *ocreata*, Schaeff., Icon., figs. 4 and 5.
— *diversipes*, Schr., F. B., ii, 23, 6.

Tenthredo corallipes (Klug), Evers., Bull. Mosc., xx, 41, 5.
Allantus hæmatopus, Ste., Ill., vii, 62, 15.
Macrophya hæmatopus, André, Species, i, 347; Cat., 45,* 26.

Black; apex of clypeus, labrum, mandibles, scutellum, and a spot on the side of the fifth, a smaller one on the sixth abdominal segments, white. Legs ferruginous-red; coxæ, posterior tarsi, the anterior at the tips, apex of hind tibiæ, and basal three fourths of the same black. Wings hyaline, costa and stigma fuscous.

The ♂ has the coxæ and the four anterior legs straw-yellow, and a narrow black stripe over posterior femora.

Length 5 lines.

Ab.—*a.* Scutellum black.
,, —*b.* Abdomen with only one white mark.
,, —*c.* Abdomen without any mark.

A much larger species than *Album punctum.* Easily recognised from it by the white mouth, no white mark over posterior coxæ, nor on tibiæ, black pronotum, &c.

Seemingly a rare form. The only precise locality in Britain known to me is Glanvilles' Wootton, Dorset.

It is more especially a southern species, occurring in France, South Germany, Hungary, Switzerland, Italy, Russia, and also Siberia.

9. MACROPHYA RUFIPES.

Tenthredo rufipes, Lin., S. N., ed. x, 557, 17; Fallén, Acta, 1808, 53, 9.
— *strigosa*, Fab., E. S. Sup., 217, 58; S. P., 36, 34; Klug, Berl. Mag., viii, 114, 80; Lep., F. Fr., pl. 6, fig. 1; Mon., 96, 271; Htg., Blattw., 293, 5; Evers., Bull. Mosc., xx, 40, 4.
— *dumetorum*, Fourc., E. P., 28; Geof., H. I., 28; Klug, Berl. Mag., viii, 115, 81; Htg., Blattw., 293, 6.
citreipes, Lep., F. Fr., pl. 6, fig. 2; Mon., 96, 272.
Macrophya strigosa, Tasch., Hym., 15; Thoms., Opus., 296, 8.
— *rufipes*, Thoms., Hym. Scand., i, 255, 9; André, Species, i, 357, 359; Cat., 44,* 13.
Allantus strigosa, Ste., Ill., vii, 63, 16.

Antennæ subclavate, black. Head black, covered with a fuscous pile, shining, punctured, front depressed, ocelli raised, clypeus moderately incised; clypeus, labrum, palpi, and mandibles white. Thorax half shining, black, with a fuscous pile, deeply and closely punctured; pleuræ opaque, deeply punctured; tegulæ, a line on the pronotum, and

scutellum white. Abdomen black, the whole of the third and fourth segments above and at the sides reddish, a large stripe on the sixth, and a smaller mark on the seventh at the sides and apex white. Legs: all the coxæ except at the apex black, the four anterior and posterior at the base straw-yellow or pale red, hind femora and tibiæ reddish, posterior tibiæ with a black line near the base, hind tarsi and calcaria black. The anterior femora have a reddish tinge. Wings hyaline, smoky at the apex, costa and stigma sordid-testaceous.

The ♂ wants the white fasciæ on the abdomen; anterior femora are reddish; coxæ nearly all straw-yellow; there is a mark of the same colour on the middle of the breast, a small black line on the upper surface of the posterior femora,; the posterior tibiæ as well as the tarsi are black; the third to the fifth abdominal segments are red all round.

Length 5—5¾ lines.

The amount of red on the abdomen is subject to variation.

Rufipes is easily distinguished from its close ally, *hæmatopus*, by the white pronotum and coxæ, blackish hinder tibiæ, red banded abdomen. The ♂ is known from the same sex in *hæmatopus* by its having (besides the abdominal band) the tegulæ whitish, abdomen without any white marking, and posterior tibiæ entirely black instead of only the basal half.

Rufipes is rare in this country, and is, so far as I know, confined to the south of England. Stephens reports it from Darenth and Coombe Woods, Devonshire, Dover; and Mr. Smith tells me that it occurs occasionally in woods in Kent.

Continental distribution: Scandinavia, near Dantzig, South Germany, Holland, France, Italy, Switzerland and Ural districts in Russia.

Body short, with white marking on thorax and abdomen. Mouth black; clypeus shortly incised. Anterior legs black, white in front; posterior femora red, tibiæ black, with a broad white band. Eyes parallel, front convex. Lanceolate cellule contracted (Species 10).

10. MACROPHYA PUNCTUM ALBUM.

Pl. VIII, fig. 11.

Tenthredo punctum album, Lin., S. E., ed. xii, 924, 23; Schr., En., 333, 669; Vill., E. P., 33.

Tenthredo punctum, Fab., S. E., ii, 119, 58; S. P., 36, 33; Pz., F. G., xxvi, fig. 21; Spin., Ins., Lig., i, 57; Klug, Berl. Mag., viii, 117, 85; Lep., F. Fr., pl. 6, fig. 6; Mon., 99, 280; Htg., Blattw., 293, 8.
— *erythropus*, Schr., F. B., 86.
Allantus punctum, Ste., Ill., vii, 62, 14.
Macrophya punctum, Thoms., Op., 296, 10; Kalt., Pfl., 432, 436.
— *album punctum*, Thoms., Hym. Scand., i, 256, 11; Cam., Fauna, 15; André, Species, i, 360; Cat., 44,* 14.

Black, shining; pronotum, scutellum, and post-scutellum yellowish-white; four anterior legs for the greater part in front with the tarsi, a band on the outer apical half of posterior tibiæ, a large spot over the hind coxæ, a spot on the last abdominal segment, and a number of oblong spots on the sides white; hind femora reddish, hind tibiæ (except the white band) and tarsi black. Wings hyaline, costa and stigma pale fuscous.

In the ♂ the scutellum, abdomen, and posterior femora are black, and there is only a thin pale band on pronotum.

Length 3½—4 lines.

The lateral abdominal marks are often obliterated, and the scutellum has occasionally a black dot in centre. The scutellum and pronotum are in rare cases quite black.

The nearest ally of this species is *M. 4-maculata*, Fab. (not a British insect), which is easily separated from it by its white mouth, black pronotum, pale posterior coxæ and trochanters, and reddish hind tibiæ.

M. punctum album does not appear to be very common. It has been taken in Scotland by Dr. Sharp. In England it occurs in the London districts; Mr. Smith says (*in lit.*), "scarce, but once plentiful on a hedge of privet;" near Dover, Glanvilles' Wootton, Devonshire.

According to the observations of Ratzburg, Saxesen, and Kaltenbach, the totally green larva feeds on the leaves of *Ligustrum vulgare* and *Fraxinus*, and Mr. Bridgman finds it on the former plant at Norwich.

Its Continental distribution extends to Scandinavia, Prussia, Pomerania, South Germany, Hungary, Holland, Switzerland, France, Italy, and Spain.

Genus ALLANTUS.

Allantus, Jurine, Hymen., 54.
— Htg., Blattw., 285.

Lanceolate cellule with a short perpendicular nervure. Posterior wings with two middle cellules. Stigma mostly pale.

Antennæ a little longer or shorter than the thorax; the first joint large, more than double the length and breadth of the second, the third joint double the length of the fourth, the succeeding joints considerably thickened, fusiform; ninth sharply conical, narrower than the eighth.

Legs of medium length, somewhat thick, the posterior coxæ not reaching beyond the apex of the second abdominal segment; the tibiæ and femora are of nearly equal length, the tarsi are longer than the former. In the ♂ the tibiæ at the apex and the basal joints of the tarsi are swollen.

Head broad, thick, projecting considerably behind the eyes, which are oval, converging, and reaching to near the base of the mandibles. Antennal fovea absent. Vertex thick. Mandibles with three subapical teeth.

Clypeus incised at the apex but not very deeply; labrum large, rounded at the apex.

Abdomen slightly inflated in the middle, subcylindrical, generally marked with yellowish or whitish bands.

In coloration the *Allanti* are usually black, with yellow bands on the abdomen; yellow marks on the mouth, pronotum, and more rarely on the pleuræ, while the legs are yellow, with the femora and tarsi more or less black. The scutellum is black, rarely yellow, and the same remark holds good for the antennæ. The general rule is that when the scutellum is yellow, so also are the antennæ wholly or in part, and *vice versâ*. The wings are generally hyaline, more or less infuscated at the apex, or they may be entirely black or bluish (metallic) black, or yellowish. The stigma is always pale. The thorax is in the majority of species roughly punctured and opaque; more rarely it is smooth and shining.

Most of the species are very variable in the coloration, hence the specific determinations are somewhat difficult unless other points beyond mere colour are attended to.

The males do not differ much, if at all, from the females in coloration and markings. When a difference exists between the two sexes, it may be either in the

♂ being darker coloured, as in *A. arcuatus*, or lighter, as in *A. cingulum*. The antennæ do not differ in length.

The species of *Allantus* are mostly found in the warmer portions of the temperate regions. Few species are found in northern countries. They extend all over the Palæarctic region, being especially common in the Mediterranean subregion, and are not uncommon in the Manchurian. They abound also in the Oriental, and to a greater extent in the Nearctic. They are found neither in the Ethiopian, Australian, nor Neotropical regions. Fifteen species are described from North America, and there are altogether fifty-nine European species.

As a whole, the points of distinction between *Allantus* and *Tenthredo* can scarcely be regarded as very important or well defined. The most noticeable is the form of the antennæ, which are short and clavate, while in *Tenthredo* as a whole they are longish and of nearly uniform thickness. In *Allantus*, too, the antennal fovea is absent. It must, however, be said that so far as the form of the antennæ is concerned the difference in this respect between *Allantus cingulum* and *T. bicincta* is by no means great (see p. 92). Still the *Allanti* are so similarly coloured, both as regards the body markings and in the pale stigma, and, as a whole, are so readily known from *Tenthredo* that there can be no hesitation in considering it a distinct genus.

Synopsis of Species.

1 (2) **Antennæ entirely luteous, wings yellowish, accessory nervure in posterior wing joined to the transverse median. *Scrophulariæ*.**
2 (15) **Antennæ black, yellow at the base. Accessory nervure in hind wings not joined to transverse median.**
3 (14) **Head and thorax deeply and distinctly punctured.**
4 (9) **Pleuræ entirely black.**
5 (8) **Fore wings with a distinct blackish blotch in the radial and cubital cellules; scutellum black, tegulæ yellow; head dilated behind the eyes; parapsides indistinct.**
6 (7) **Fourth abdominal segment with a yellow band, stigma testaceous. *3-cinctus*.**

7 (6) Fourth abdominal segment without a yellow band, stigma fuscous at the apex. *4-cinctus.*

8 (5) Fore wings without a distinct blotch in fore wings, tegulæ black, scutellum marked with yellow; the fourth and fifth segments black beneath; parapsides distinct, head scarcely dilated behind the eyes. *Marginellus.*

9 (4) Pleuræ marked with yellow marks.

10 (11) Wings yellowish; only the hind femora marked with black; hind tibiæ and tarsi luteous. *Flavipes.*

11 (10) Wings hyaline.

12 (13) Abdomen with two complete yellow bands; hind tarsi and apex of tibiæ reddish. Tegulæ black. ♂ abdomen beneath black; the apical segments yellow above. *Schaefferi.*

13 (12) Abdomen with three complete bands; hind tarsi and apex of tibiæ black; tegulæ partly yellow. ♂ belly yellow; the apical segments black above. *Arcuatus.*

14 (3) Head and thorax smooth, covered with a silky pubescence. Parapsides deep. Tegulæ black, 5th (sometimes 6th) segment yellow all round; stigma fuscous at apex; hind tarsi and tibiæ reddish. *Cingulum.*

15 (2) Antennæ entirely black. Head strongly dilated behind the eyes. Head and thorax covered with a long silky pubescence, smooth, with scattered punctures.

16 (17) Wings yellowish, hyaline, four front legs partly yellow, pronotum with a yellow border; pleuræ tuberculated. *Tenulus.*

17 (16) Wings deep violet-black, four front legs violet-black, pronotum without a yellow border, pleuræ smooth. *Vidua.*

1. ALLANTUS SCROPHULARIÆ.

Pl. I, fig. 2 and 2 *a*, larva.

Tenthredo scrophulariæ, Lin., S. N., x, 556, 12; Fall., Acta Holm., 1808, 48, 1; Fab., E. S., ii, 112, 29; S. P., 28, 1; Geof., H. I., 13; Schr., En., 330, 663; Pz., F. G., 89, fig. 10; Spin., Ins. Lig., i, 53, 1; Reaumur, Mém., v, Tab., 13, figs. 12—23; Klug, Berl. Mag., viii, 131, 102; Lep., Mon., 87, 25, 3; Evers., Bull. Mosc., xx, 35, 1; Htg., Blattw., 286, 1.

Allantus scrophulariæ, Brischke, Beschr., 7, pl. 1, fig. 4 (lar.); Voll., Tidj. Ent., iii, 99—103, pl. 7; Zool. (s.s.), 8653; Bouché, Naturg., 138; Kalt., Pfl., 460 and 462; Ste., Ill., vii, 57, 1; Thoms., Opus., 297, 1; Hym. Scand., i, 257, 1; Rudow, Stett., Ent. Zeits., 1871, 87, 1; Newman, Ent. Mag., pl. 1, figs. 2, 3; Cam., E. M. M., xvi, 221.

Tenthredo propinqua, Klug, Berl. Mag., viii, 132, 105; Htg., Blattw., 287, 2.

Black, covered with a close fuscous pubescence, strongly punctured, antennæ, knees, tibiæ and tarsi luteous; clypeus, labrum, tegulæ, edge of pronotum, a spot below the fore wings, scutellum, a spot behind it, a spot over posterior coxæ, the apical edge of basal segment of abdomen, and of the fourth to the ninth whitish-yellow. Wings yellowish, the radial and top of cubital cellules infuscated, costa and stigma yellowish. The anterior femora have a yellow line above.

The ♂ has the basal abdominal segment and the third and following segments broadly lined with pale yellow all round, and all the femora are lined with pale luteous above and in front.

Length 6—7 lines.

The larva feeds on *Scrophularia nodosa* and *Verbascum nigrum*, in the leaves of which it eats irregular holes in the middle, generally avoiding the nerves, although it eats very close to them. The head is deep black, pale at the mouth; it is narrower than the second segment, and has a few scattered hairs over it. The body is of a bluish-grey velvety colour to the spiracles, below which it is white. The legs are yellowish-white, with black claws, and at the base of each is a small black mark. Along the back, in the centre, is a line of eleven large (compared to the others) roundish black marks; between this and the spiracles are three irregular rows of smaller black dots, the outer ones being the largest. The margins of the spiracles are pale brown, and below each are two small dots. The skin is in folds.

When young it is of a pale bluish-grey colour. At the last moult it casts off the markings, and becomes of a uniform pale reddish-brown colour, with a somewhat darker stripe down the back. The head is of the same colour, with a darker mark on the vertex; the eyes being surrounded with a darker ring. If anything, too, the skin becomes more folded and wrinkled.

It pupates in the earth, forming an earthern cell in which it passes the winter, emerging as a fly in early summer. In England it is common in the midland and southern counties, but does not, so far as I know, occur in Scotland. Its distribution extends all over Europe.

2. ALLANTUS TRICINCTUS.

Pl. I, fig. 3, larva; Pl. IX, fig. 4, ♀.

Tenthredo tricinctus, Fab., S. P., 30, 5; Geof., Ins., ii, 276, 11; Klug, Berl. Mag., viii, 138, 108; Htg., Blattw., 288, 7; Evers., Bull. Mosc., xx, 38, 8.
— *vespiformis* (Latr.), Lep., Mon., 89, 258.
— *rustica*, De Geer, Mém., ii, 234, pl. 34, figs. 9—19 (lar.).
Allantus vespiformis, Ste., Ill., vii, 58, 3.
— *tricinctus*, Voll., Tidj. Ent., i, 171—176, pl. 9 (lar. etc.); Brischke, Beschr., 15, pl. iii, figs. 5 *a*, *b*, *c*; Kalt., Pfl., 304; Cam., Fauna, 16; André, Species, i, 388; Cat., 47,* 6.

Black, almost opaque, densely covered on head and thorax with a short grey pile; the head and thorax being also strongly punctured, the pleuræ tuberculated, abdomen smooth, almost shining, and with a few shallow punctures. The first joint of the antennæ, the greater part of clypeus, a line on pronotum, a broad one on the basal abdominal segment above, one all round on the fourth and fifth, a small one on the middle of seventh, and the whole of the eighth and ninth as well as a spot over the posterior coxæ are yellow. Tegulæ and legs reddish-yellow, the greater part of the femora and base of coxæ black. Wings hyaline, with a brownish band extending from the base to the apex of the radial and the upper half of the cubital cellules. The costa and stigma testaceous, mandibles piceous, palpi dark fuscous.

In coloration the ♂ is nearly similar, except that the labrum is yellow, the base of antennæ and the posterior tarsi with apex of tibiæ blackish or fuscous. The wings, too, are, if anything, darker.

Length 5½—6 lines.

Ab.—*a*. A narrow lateral yellow line on the third and sixth segments of abdomen.

The larva is of the same form as that of *Scrophulariæ*. Its ground colour is a dull grey, sometimes with a bluish or even a pinkish hue. On the back, on each segment except the last, is a triangular, deep brownish or blackish spot, the narrow base of which points towards the head; the broad opposite end is curved inwardly, each point ending in a curved projection; inside of this are two small black dots. The first of these dorsal marks is somewhat oval and divided in the middle by the food canal, Laterally, a stripe of a darker grey than the ground tint runs through the spiracles. The head is black, with paler mouth, and covered with a short, scattered pile. The legs have black claws.

After the last moult it becomes of a pale ochreous colour, with a pale brownish head. When young it has a bluish tint, and the dorsal markings are not clearly defined as regards their shape.

The larvæ have various food plants, being found on the snow-berry, honeysuckle, jasmine, guelder rose, ash, and on alder, according to Rudow. During the day they remain quiet, rolled up in a ball, and it is not till the evening that they commence to feed. Generally they devour holes in the centre of the leaf, but they will also eat along the edge. They form an oval cell in the earth in which to pass the winter. According to Brischke they line the smooth inner side of this cell with silk, but this is not always done in confinement.

The perfect insect appears in June. It does not seem to be very common. Stephens records it from Dover, Ripley, and Darenth; Mr. Smith tells me it is met with in Kent and Hampshire; Mr. Dale takes it at Glanvilles' Wootton, and I have captured it at Clydesdale, where the larva feeds on the guelder rose.

It is found in Scandinavia, Germany, Holland, France, Switzerland, Italy, Tyrol, Portugal, Russia, Siberia.

3. ALLANTUS QUADRICINCTUS.

Tenthredo quadricinctus, Uddmann, Disp., 83.
Allantus 4-cinctus, Thoms., Opus., 297, 3; Hymen., Sc., i, 258, 3; Cam., E. M. M., xvi, 221; André, Species, i, 399; Cat., 37,* 8.

Black; head and thorax opaque, punctured, covered with a scattered pubescence; abdomen smooth, shining; two basal joints of antennæ, labrum, clypeus, a broad line on the pronotum, tegulæ, the fifth abdominal segment all round, apical half of the first and the seventh to ninth above yellow. Legs yellow; coxæ (except at the apex), the greater part of the posterior femora, anterior behind and slightly in front black; apex of tibiæ and tarsi reddish. Wings hyaline, with a yellowish tinge, the radial and cubital cellules infuscated; costa and stigma testaceous, the latter fuscous at the apex. The transverse radial nervure is received a little beyond the middle of the third cubital cellule. ♀.

Length 4½—4¾ lines.

Almost similar in body coloration to *A. zona*, Klug, but differing in the roughly punctured head and thorax, the wider yellow line on thorax, and red posterior tarsi and apex of tibiæ. From *marginellus* it may be known by the yellow labrum and tegulæ, half white, half fuscous stigma, black scutellum, and by the fourth abdominal segment wanting the yellow ring found in *marginellus* (and 3-*cinctus*). It also wants the yellow spot over the posterior coxæ found in 3-*cinctus* and *marginellus*.

Seemingly rare. I have seen two individuals—one taken by the late F. Smith, and another in Shuckard's collection, both probably from the South of England.

Continental distribution: Sweden, France.

4. ALLANTUS MARGINELLUS.

Tenthredo marginella, Fab., E. S., ii, 117, 50; S. P., 292; Klug, Berl. Mag., viii, 133, 104; Htg., Blattw., 287, 3; Evers., Bull. Mosc., xx, 36, 3.
— *succinctus*, Lep., F. Fr., pl. 5, fig. 5; Mon., 93, 266; André, Species, i, 401; Cat., 47,* 7.
Allantus viennensis, Ste., Ill., vii, 58, 4; Cam., E. M. M., xvi, 221.
Tenthredo viennensis, Pz., F. G., lxv, fig. 5; Lep., F. Fr., pl. 5, fig. 7; Mon., 95, 269; Fall., Acta, 1808, 49, 3.
Allantus marginellus, Rudow, Stett. Ent. Zeits., xxx, 89, 2; Thoms., Opus., 293, 2; Hym. Scand., i, 259, 4.
— *decipiens*, Foerster, S. E. Z., 1848, 288.

Black, half shining, covered with a scattered pubescence; head and thorax punctured; two basal joints of antennæ, clypeus, sides of pronotum, two marks on scutellum (sometimes joined), a band on the apical half of the first abdominal segment, the greater part of the fourth and fifth above and at the sides, a stripe on the side of the sixth, the seventh, eighth, and ninth in the middle above, and a spot over the posterior coxæ yellow. Legs yellow; coxæ, except at apex, the greater part of femora, black; tibiæ and tarsi fulvescent; the tibiæ at the base yellow. Wings hyaline, clouded from the base of stigma. Tegulæ black.

The ♂ has the labrum, clypeus and mandibles at the base yellow the mark on the pronotum is smaller; there is only a thin yellow band on the fourth abdominal segment; the anterior tibiæ and tarsi are yellow in front; the hinder pair have only the knees yellow, and the posterior tarsi are thickened and fuscous in the middle. The last abdominal segment and the anal appendages are yellow. In one aberration the scutellum is black and the pronotum without any yellow.

Length 5½—6 lines.

Ab.—a. The fourth and fifth segments each with a broad yellow band; the posterior tibiæ dull yellow to beyond the middle; the apex of hinder tibiæ and all the tarsi fuscous (Deal, F. Smith).

Ab.—b. As in *a*, but the yellow more developed; a distinct yellow mark on lower part of prothorax, and one beneath fore wings (in Shuckard's collection).

The typical *marginellus* is stated to have the first, fourth, fifth and apical segments yellow, but this is not a constant character; indeed, Thomson describes the first to ninth segments as yellow in the middle; and in some continental specimens (Germany) which I have the five apical segments are broadly banded with that colour. The band on the fifth segment is often absent, or it may be divided in the middle, the sixth may be entirely black; the yellow on the scutellum is not unfrequently divided in the middle, or it may be absent; a small yellow spot is sometimes seen on the hinder edge of the pleuræ, while the posterior tarsi may be black, fuscous, or coloured like the tibiæ. Judging, too, from the descriptions, the ♂ must vary considerably.

This insect comes nearest to 3-*cinctus*, but is smaller, the punctation is not so rugged; scutellum is smoother and yellow; labrum piceous, not black; the incision in the clypeus is deeper; the femora bear more black; while, most noticeable of all, the wings are not blackish at the apex.

It agrees with *cingulum* in having the hinder tibiæ and tarsi more or less reddish, but its labrum is fuscous, the incision in the clypeus is very much shallower, the puncturing on head and thorax deeper, and they are not so shining, the scutellum bears two yellow spots, the tarsi are marked with black, while the abdominal bands do not go all round, but only on the back and sides. The wings, too, are infuscated at the apex, and the stigma is almost unicolorous, while the radial nervure is received near the middle of the third cubital cellule, instead of close to the third transverse cubital nervure, as in *cingulum*.

According to Dours (Cat. Syn., 20), the larva feeds on *Umbelliferæ*.

Marginellus appears to be somewhat rare in this country. Mr. Smith tells me that it is found in the London district. Stephens gives Coombe Wood and Norfolk as localities, Mr. Dale records it from Glanvilles' Wootton and Whittlesea Mere, and Mr. Bignall sends it from Plymouth.

Continental distribution: Sweden, Germany, Switzerland, Italy, Russia.

5. ALLANTUS FLAVIPES.

Pl. 1, fig. 8, Larva (after Curtis).

Tenthredo dispar, Klug, Berl. Mag., viii, 141, 111; Htg., Blattw., 289, 10; Evers., Bull. Mosc., xx, 47, 13.
— *flavipes*, Fourc., E. P., 26; Geoff., H. J., ii, 26; Lep., Mon., 132, 402.
Allantus flavipes, Curtis, B. E., pl. 764 (♂, dets. and lar.); Cam., E. M. M., xvi, 221; André, Species, 1, 383; Cat., 48,* 15.
— *marginellus* (in pt.), Rudow, S. E. Z., xxx, 137.
— *dispar*, Kalt., Pfl., 274.
— *rufocingulatus*, Tischbein, S. E. Z., xiii, 108 (1852).

Black, shining, covered with a scattered down; two basal joints of antennæ, labrum, clypeus and base of mandibles, tegulæ, pronotum, a large spot on pleuræ, the outer edge of the basal abdominal segment, a somewhat triangular spot on the sides of all the others, outer edge of the fourth to seventh, the two apical segments wholly, and the legs yellow; coxæ black at base; the apical joints of the posterior tarsi black; apex of fore tibiæ and the tarsi fuscous-black; the posterior paler. Wings yellowish; costa, stigma and nervures luteous; the palpi are pale yellow; tips of mandibles blackish.

The ♂ has the fourth to sixth and base of seventh abdominal segments reddish; the following and a very thin line on the sides of the

first yellow; there is a black line over the posterior femora. Otherwise it is of the same coloration as the ♀.

Length 5—5¼ lines.

The yellowish wings and legs, as well as the fact of all the abdominal segments being broadly marked with the same colour, the yellow posterior tarsi and the black anterior, as well as the large yellow spot on the pleuræ, will readily enable this species to be identified. Compared with *arcuatus* the body is smoother and not nearly so strongly punctured. The red and yellow abdomen of the ♂ makes it very conspicuous compared to the same sex in the other British species. In both sexes the amount of yellow on the body varies.

Two accounts have been published of the early history of this insect. Curtis (l. c.) relates that the perfect insect appeared in abundance at the end of June in Battersea Fields. Wishing to obtain living specimens he went out there, and found two females upon the flowers of *Sinapis nigra* and also six larvæ, which fed on that plant as well as on *S. alba.* The larvæ ate the leaves, stalks and flowers. Curtis, unfortunately, did not manage to rear these larvæ, but he had no doubt about their being those of *A. flavipes.* Mr. F. Smith, too, confirms this opinion, he having reared them himself. According to Curtis's figure of the larva it was of a grey colour, with ten (? eleven) large black marks over the legs; above each of these, again, is a small black dot. The head is testaceous. At the last moult the black marks were cast off, except those on the head (which are not shown in the figure). The pupa state was passed in the earth.

The other account is given by Kaltenbach, who says that F. Eppelsheim bred the insect at the beginning of June. The larvæ fed up to the end of September on the yellow flowers of *Bupleurum falcatum,* but not eating the upper tender leaves. Unfortunately no further details are given. In any case, however, I think there can be no doubt as to the correctness of the observations of Curtis and Smith.

Mr. Smith tells me that *flavipes* is scarce in the London district, but has once or twice been found in plenty.

On the Continent it appears to be somewhat rare. It inhabits Germany, France, Hungary, Russia.

6. ALLANTUS ARCUATUS.

Pl. IX, fig. 4 *a* and *b*, Trophi; fig. 5, Saw.

Tenthredo arcuatus, Forster, Cent., i, 79; Lep., Mon., 94, 266 (*note*).
— *marginella*, Pz., F. G., lxiv, fig. 7; Lep., Mon., 91, 261; Fall., Acta, 1808, 52, 7.
— *flaveola* (Gmel.), Lep., Mon., 90, 260.
— *notha*, Klug, Berl. Mag., viii, 140, 110; Htg., Blattw., 289, 9; Evers., Bull. Mosc., xx, 37, 5.
Allantus arcuatus, Ste., Ill., vii, 59, 7; André, Species, i, 376; Cat., 50,* 43.
— *melanotus*, Rudow, S. E. Z., xxx, 139.
— *nothus*, Rudow, S. E. Z., xxx, 137, 12; Thoms., Opus., 298, 4; Hym. Scan., i, 260, 5; Cam., Fauna, 16, 1; E. M. M., xvi, 221.

Black; head and thorax almost opaque, covered with a close pile and punctured; basal joint of antennæ, labrum, clypeus, tegulæ, a line on the pronotum, one or two large marks on pleuræ, scutellum, the greater part of the first abdominal segment, a thin line on most of the others, the sides and the greater part of the belly pale yellow. Legs yellow; coxæ at the base, femora above, apex of the hind tibiæ and tarsi black; the anterior tibiæ have a small black line behind, and the tarsi are either yellow entirely or have a black line behind. The ventral segments are marked at the apex with black, but in rare cases the belly is quite yellow. Wings hyaline; costa and stigma testaceous.

The ♂ has the whole of the legs lined with black behind; the belly and coxæ clear yellow. I have never seen a specimen with the scutellum yellow, and the yellow line on the pronotum is smaller, if not obliterated entirely.

Length 4¾—5¼ lines.

A very variable species. The basal joints of the antennæ may be entirely yellow; yellow only on the lower surface or quite black; the scutellum is often black. The anterior tibiæ and tarsi are generally slightly marked with black behind, but as frequently they are entirely yellow; more rarely the posterior tibiæ are lined with black behind; the trochanters are sometimes spotted with black; the edges of the abdominal segments have generally greenish-yellow lines, but not rarely they are entirely black.

The greenish-yellow marks on the pleuræ readily separate this insect from the other British species, except from *flavipes*, which differs from it markedly in coloration.

Rudow (l. c.) is of opinion that *arcuatus*, *dispar* (*flavipes*) and *Schaefferi* are varieties of the same species, which he would name *marginellus*, Pz. He says that the larvæ* of the three species just mentioned are coloured alike, being of a green colour, which varies to a clearer or deeper hue. Before pupating they are brownish, many times bearing brown spots. He found them on *Alnus*, *Umbelliferæ*, and *Achillea*, but always immediately before they were preparing to spin up, so that he was in ignorance of their precise habits, and he seems to be even in doubt as to the particular food plants.

With this opinion of Rudow's regarding the specific identity of the three species we cannot agree, and it is evident that *flavipes* has a very different larval history from *arcuatus*.

Arcuatus is one of our commonest saw-flies. It is found everywhere in June and July, the imago frequenting the flowers of *Ranunculaceæ*, *Umbelliferæ*, and *Compositæ*. It is very carnivorous, and will often attack insects as big if not bigger than itself. The species is equally common everywhere on the Continent.

---

* "Larva opaca, viridis, pruinosa, segmentum marginibus flavoviridis, oculis magnis brunneis; capite viridi, crasso. In alni," l. c., p. 137. André refers this description of larva to *Schaefferi*.

7. ALLANTUS SCHAEFFERI.

Tenthredo Schaefferi, Klug, Berl. Mag., viii, 139, 109; Htg., Blattw., 288, 8; Evers., Bull. Mosc., xx, 36, 4.
Allantus Schaefferi, Cam., E. M. M., xvi, 221; ? Rudow, S. E. Z., xxx, 137; André, Species, i, 375; Cat., 48, *14.

Black; vertex and mesonotum punctured, semiopaque; pleuræ likewise punctured, but not so deeply as the mesonotum; the basal joints of the antennæ, clypeus, palpi, mandibles, scutellum, the greater part of the pronotum, a small spot on the pleuræ, a large mark between the two posterior coxæ, a ring on the basal abdominal segment, a small spot on the side of the third, a ring on the hind edge of the fourth and fifth, a spot on side of sixth, a smaller one on seventh, the apex and the edges of all the segments beneath yellow. Labrum and tips of mandibles reddish-testaceous. Legs yellow; coxæ at base, trochanters in part, and a line on femora black; apex of posterior tibiæ and the tarsi reddish; the joints at the apex fuscous. Wings hyaline; costa and stigma testaceous; tegulæ black.

The ♂ has the band on the fourth abdominal segment broader than in the ♀, that on the fifth is interrupted in the middle; the yellow on the apical segment is greater, and the anal appendages are of the same colour; the belly is entirely black. The coxæ and trochanters are almost entirely yellow; the four anterior femora have only a narrow black line above, the posterior are only yellow on the under side; the four front tibiæ and tarsi are lined with black above, except at the base of the former, while the apical half of posterior tibiæ and the tarsi are entirely black, the tarsi being thickened and much longer than in the ♀. The wings are decidedly infuscated at the apex, and are somewhat shorter than in the female.

Length 4½—5 lines.

Very similar to *arcuatus*, but larger; the puncturing on the mesonotum coarser and more opaque; the yellow mark on the pleura is smaller, and the tegulæ are black.

It is not a common species, and is confined to the South of England, where is has been taken near Hastings by Mr. Butler, and by Mr. Bridgman at Norwich.

Continental distribution: Germany, France, Switzerland, Italy, Hungary, Russia.

8. ALLANTUS CINGULUM.

Allantus cingulum, Klug, Berl. Mag., viii, 135, 105; Htg., Blattw., 287, 4; Evers., Bull. Mosc., xx, 37, 6; Rudow, S. E. Z., xxx, 141; 15; Cam., E. M. M., xvi, 221.

Black, smooth, shining, not punctured; the head, thorax and abdomen covered with a white silky down; the basal joints of the antennæ, labrum, clypeus, sides of pronotum, and the apical half of the basal abdominal segment above clear yellow; the fifth all round, a ring on sixth, and (sometimes at the apex, more rarely at base) the ninth above pale yellow. Legs: coxæ, trochanters, base of femora and tibiæ yellow; apex of hinder tibiæ and tarsi reddish; anterior tarsi yellowish; the apical joints and the base of tibiæ black or fuscous; femora black, except at base and apex. Tegulæ black, white in front. Wings hyaline, scarcely infuscated at the apex; costa and stigma testaceous, the latter fuscous at the apex.

The ♂ has only a narrow yellow stripe on the first abdominal segment; the fifth, and sometimes the sixth, the belly (save at the apex) and legs are yellow; apex of the hinder femora, tibiæ and the hinder tarsi black. The stigma, too, is darker.

Length 5¼—5¾ lines.

Ab.—a. The sixth abdominal segment yellow beneath and above. This is the commonest form in this country; according to the descriptions the sixth segment is only yellow on the upper side.

Ab.—b. Scutellum yellow, entirely or in part.

This species differs from all the other British *Allanti* in having the head and mesonotum smooth, shining, and unpunctured. In that peculiarity it agrees with *A. zona*, Kl., and *A. zonula*, Klug, but is known from both by having the sixth abdominal segment marked with yellow, and the apex of hinder tibiæ and tarsi luteous, both the other species having these parts annulated with black. *Zonula* is further distinguished from it by having the head scarcely dilated behind the eyes, four anterior legs entirely yellow, the hind femora only black at apex, and the seventh abdominal segment without any yellow band.

So far as I know it is not very common, and seems to be confined to the south. Mr. Smith took it in

Birch Wood, and I have received it from Hastings, where it was taken by the Rev. A. N. Bloomfield.

It appears to be rare on the Continent, and has been recorded from Germany, Switzerland, France and Russia.

9. ALLANTUS TENULUS.

Tenthredo tenula, Scop., I. C., 725; Vill., I. P., 68.
— *Rossii*, Pz., F. G., xci, fig. 15; Lep., Mon., 92, 264.
— *zonata*, Fall., Acta, 1808, 51, 5.
— *2-fasciata*, Klug, Berl. Mag., viii, 141, 112; Htg., Blattw., 289, 11; Evers., Bull. Mosc., xx, 39, 10.
Allantus tenulus, Ste., Ill., vii, 60, 8; Cam., E. M. M., xvi, 221; André, Species, i, 372; Cat., 47,* 2.
— *2-fasciatus*, Rudow, S. E. Z., xxx, 94, 8; Thoms., Opus., 298, 8; Hym., Scand., i, 261, 8.

Black, almost shining, densely covered with a short grey pile; head and thorax finely punctured, pleuræ roughly so; a line on the pronotum, a band on the upper surface and sides of the third and fourth abdominal segments, and tibiæ and tarsi yellow; apices of all the tibiæ and of the apical tarsal joints fuscous; a yellow band is over the apical half of the anterior femora. Wings with a yellowish tinge, clouded at apex from the stigma; costa and stigma yellowish-testaceous.

The ♂ is similar, except that the tarsi are entirely black.

Length 5½—5¾ lines.

Tenulus is readily known from all the other British species of the genus by the totally black antennæ and mouth, less clavate antennæ, legs black at the base, &c. The head behind the eyes, too, projects more, and the pubescence on the head and thorax is darker. *Allantus Koehleri*, Kl., is a close continental ally, but it has four of the abdominal segments yellow, and there are two small yellow spots on the post-scutellum. In *tenulus* the size of the yellow abdominal bands varies.

The larva is stated by Rudow to have the body "toto pruinoso, pilifero," brownish-green on the upper part, clear green on the lower. On the back are two brownish dorsal stripes; each segment bears two diverging brownish strips on the sides, as well as eight points in two rows. The head and anus are brown, the former covered with short bristles; eyes black. He says, also, that the colour varies from brown to clear green, and the markings are subject to irregularity. The larva feeds on *Umbelliferæ* and alder.

Tenulus seems to be rare. Stephens says that it was taken near London in July, and Mr. Dale informs me that it has occurred in the Bristol district.

Continental distribution: Sweden, Germany, Switzerland, France, Italy, Tyrol, Russia and Greece.

10. ALLANTUS VIDUUS.

Pl. IX, fig. 3, ♀.

Tenthredo vidua, Rossi, F. E., 715, tab. 3, fig. 6; Lep., F. Fr., pl. 5, fig. 4; Mon., 93, 265.
— *sareptana*, Evers., Bull. Mosc., xx, 39, 11.
Allantus viduus, Cam., E. M. M., xvi, 221; André, Species, i, 371; Cat., 47,* 1.

Deep violet-black, shining, with a few shallow punctures; head and thorax pilose; the greater part of the third abdominal segment, above and at the sides, and the posterior tibiæ, except the extreme apex, white. Wings dark violet—black, iridescent.

The ♂ has the posterior tibiæ black.

Length 6—7 lines.

I have noticed the following aberrations:

Ab.—*a*. Anterior femora at the apex and tibiæ in front white; fourth segment with a white line at the side, that on the third being narrower in the middle. ♂ and ♀. These are two specimens from Sicily, taken by Prof. Zeller, and stuck on the same pin. The ♀ has the basal joint of the posterior tarsus white, and the tibia in the ♂ is white as in the ♀.

Ab.—*b*. As in description, but anterior tibiæ white in front. ♀.

Ab.—*c*. Apex of anterior femora and tibiæ white in front; abdomen without the white ring. ♂. A specimen which I received from Dr. F. Rudow, of Perleberg, with the locality Greece.

In the form of the head, antennæ and body generally *viduus* agrees with *tenulus*. The deep violet-black colour distinguishes it from all the other forms.

As a British species it is known by a single specimen taken by the late Edward Newman at Darenth Wood, and one in Mr. C. W. Dale's possession from Dover.

It is purely a southern insect. The Rev. T. A. Marshall, F.L.S., informs me that it is common in the Pyrenees, where it flies in the sunshine. It also inhabits France, Switzerland, Tyrol, Hungary, Italy, Dalmatia, Greece and Russia.

Genus SCIOPTERYX.

Sciapteryx, Ste., Ill., vii, 56 (1835).
Eniscia, Thoms., Opus., Ent., 299.
Allantus, Auct.

Wings: lanceolate cellule broad, with a short perpendicular nervure.

Antennæ pilose, short, thick, scarcely longer than the thorax; the first joint very large, with a short pedicle at the base, truncated at the apex; double the length and thickness of the second, third more than double the length of the fourth; the fifth to eighth somewhat swollen, varying in length; ninth conical, thinner than the others.

Clypeus with a semicircular emargination at the apex, the outer edges sharp.

Labrum emarginated at the apex.

Head broad, thick; front thick; antennæ placed wide apart; vertex thick, its sutures scarcely visible; frontal sutures entirely so. Eyes small, scarcely converging, considerably removed from the base of mandibles.

Abdomen depressed, short, thick. Blotch large.

Legs longish; tibiæ longer than the femora.

The position of the eyes separates this genus readily from *Allantus*. It differs also in the body shape and in coloration, being much shorter and thicker, with the abdomen more depressed than in the last-mentioned genus. Characteristic, too, is the emarginated labrum, while the antennæ are not so thickened at the apex, being also pilose. So far as is known the species are black, with the apical segments of abdomen lined with white.

I am not aware that *Sciopteryx* is found elsewhere than in Europe and North America.

SCIOPTERYX COSTALIS.

Pl. IX, fig. 6, ♀.

Tenthredo costalis, Fab., E. S., ii, 109, 22.
Hylotoma costalis, Fab., S. P., 24, 15.
Tenthredo costalis, Vill., Lin. Ent., 79; Lep., F. Fr., pl. 7, fig. 5; Mon., 108, 314; Klug, Berl. Mag., viii, 78, 65; Htg., Blattw., 290, 13.
— *fulvivenia*, Schr., En., 338, 682.
Allantus costalis, Rudow, S. E. Z., xxx, 93, 7.
Sciapteryx costalis, Ste., Ill., vii, 56, 1; Cam., Fauna, 16, 1; André, Species, i, 408; Cat. 51,* 1.

Short, thick, black; head and thorax strongly and coarsely punctured, covered with a grey pubescence; greyish-white are the inner orbits of the eyes, clypeus (except the extreme apex, which is reddish-brown), labrum, mandibles, a line along the pronotum, coxæ in part, the greater part of the femora and tibiæ in front, a thin line on the third, fourth, and fifth abdominal segments above, the greater part of the succeeding above, as well as the sides and belly. Tegulæ, base of costa, stigma, and a spot in front of the latter ochreous-yellow; the rest of the costa and stigma, with the nervures, black. Wings fuscous. The antennæ have the apical joints brownish. ♂

The female has only the inner orbits of the eyes in the middle, the labrum, tibiæ in front, and the apical segments of the abdomen, above and at the sides, white; the coxæ and femora are entirely black; trochanters pale.

Length 4¼—4¾ lines.

This is the only British species known of this genus, which contains two other European forms likely to occur here, viz. *S. consobrinus*, Kl., which differs from it in having the mouth, orbits of the eyes, costa and stigma quite black; the white line on the pronotum being also smaller; the tegulæ only brownish in front, black behind, and the wings hyaline; and *S. artica*, Thoms., which has the clypeus deeply incised in the middle; antennæ bare; head and thorax alutaceous, and the tibiæ and tarsi luteous.

Costalis does not appear to be a very common species in Britain, although it is widely distributed. Stephens records it from Coombe Wood, and near Bristol and Hertford. Mr. Parfitt takes it in Devonshire, and Mr. Dale at Leelworth, while Dr. Sharp has captured it in Braemar and Thornhill. It is found early in the season, early in April in England, May in Scotland.

On the Continent it has been recorded from Germany, France and Switzerland.

Sub-tribe DOLERIDES.

Genus DOLERUS.

Dolerus, **Jurine, Hymen., 56.**

Wings with two radial and three cubital cellules; the first cubital small, the second long and receiving the two recurrent nervures. Lanceolate cellule with an oblique cross nervure. Basal nervure straight, received at a distance from cubital. Costa dilated before stigma. Transverse median nervure received in middle of discoidal cellule. Stigma black, often pale at the base. Two middle cellules in hind wings.

Antennæ 9-jointed, generally inserted immediately over the clypeus, not longer, if not shorter than the abdomen, the third joint a little longer than fourth.

Legs of moderate length, patellæ distinct; claws armed with a minute tooth; calcarea short and rather blunt; posterior tarsi shorter than tibiæ.

Head with the vertex thick; suture not very distinct. Eyes small, not reaching to base of mandibles. Clypeus large, incised, but not deeply. Labrum of moderate size, rounded at apex. Mandibles with three subapical teeth. See Pl. XII, fig. 14.

Thorax with the sutures and parapsides distinct. Cenchri large, oval.

Abdomen sharply contracted from sixth segment; the blotch small, but distinct enough. The dorsum is often keeled; cerci large. Saw short.

The species of this genus have generally the head and thorax more or less punctured, and covered with longish hair. Most of the species are black, or black with the legs more or less reddish, or more rarely white; or the abdomen may be banded with red, in which case the legs may be either entirely black, or black and red. With the red-banded species the sexes often differ very much in coloration, while they have the antennæ longer. Their bodies are generally thickish, but are more cylindrical with the red-banded species.

The *Dolerides* are chiefly vernal species, in fact, they are amongst the earliest to appear of the *Tenthredinidæ*, and are often found on willow catkins. Not much is known about their larvæ, but so far as they have been identified they do not differ in any essential points from those of the *Tenthredinides*. All the species that have been discovered feed either on grasses (*Festuca*, &c.) or on *Juncus*. In colour they are greenish, or dark coloured on back and upper part of the sides, the lower part being white. So far as is known they do not spin cocoons, but form cells in the earth to pass the period of transition.

They are of wide distribution in the Palæarctic region, they are also found in Northern China, and are not uncommon in the Nearctic region. Nearly sixty European species have been described, as well as seventeen North American.

Leach formed the yellow-banded species into a distinct genus—*Dosytheus*, which he separated from *Dolerus* by the species (according to him) having the third antennal joint longer than the fourth, these joints being said to be equal with the other genus. That peculiarity, however, is worthless, as is also the colour, which was used by Stephens as a means of generic distinction. The sub-tribe thus contains only one genus.* It is most nearly related to the *Tenthredinides*, but differs in the alar neuration and body form, which is very uniform. Most of the species have the head and thorax punctured and covered with longish hair, this latter being the case with the apical abdominal segments and the belly. The last (ninth) abdominal segment is more developed on the dorsal side than in the *Tenthredinides*.

The yellow-banded species are not difficult to identify, but great difficulty is experienced in determining the black-bodied ones, and I am not at all satisfied that I have succeeded in describing our species in a clear manner. It is very difficult to find good specific characters that do not vary; and another difficult task is to assign the males to their proper partners. The best characters appear to be afforded

---

* As regards *Pelmatopus* (placed by Hartig as a sub-genus of *Dolerus*) see *infra*.

by the form of the head, by the amount of puncturing on it and on the thorax, by the form of the thoracic sutures, of the neuration, and of the ovipositor. As regards punctation it cannot always be depended upon, for it seems to vary in intensity in the same species. By the form of the head—in wanting sutures on the vertex—*fissus*, *oblongus* and *megaptera* are readily separated from the other species. Another well-marked group is formed by *coracinus* and *anthracinus* distinguished alike by the smooth, shining, almost impunctate body, and by the suture bounding the middle lobe of the mesonotum being semi-circular at the apex, while with the other species it is triangular, and their mesonotum is punctured almost throughout. There can be no doubt that the form of the ovipositor can be safely relied upon in separating the species, but it is not always easy of application. The black species should always have their saws extended in such a way when the insects are fresh that they can be examined by the microscope—a procedure which will save much trouble in naming the species afterwards. The position of the nervures may, within certain limits, be depended upon, but no great reliance can be placed on the colour of the spurs, though this was a character relied upon by Hartig for discriminating species. It only remains to add that the form of the body is apt to change, owing to the abdominal segments shrinking in. This causes sometimes the abdomen to bulge out at the sides and become depressed on the back. With age, too, the nervures become paler.

Synopsis of Species.

1 (4) **Eyes oblong, inner orbits margined; tegulæ and labrum white; abdominal segments in both sexes, or in ♂ only, marked with white membranous spots. Parapsides not dilated behind.**

2 (3) **Legs black; the anterior knees and base of tibiæ dirty white.** ***Palmatus.***

3 (2) Legs for the greater part red. ***Vestigialis.***

4 (1) Eyes oval, the inner orbits not margined. Abdomen without membranous spots. Parapsides dilated behind.

5 (14) Abdomen red from the second segment; in ♂ red in centre; legs black. Thorax for the greater part red with the ♀, black with the ♂.

6 (13) Thorax marked with red.

7 (8) Scutellum red; three black marks on mesonotum. *Triplicatus.*

8 (7) Scutellum black.

9 (10) Base of abdomen and a large space beneath fore wings red. *Lateritius.*

10 (9) Base of abdomen and mesopleura black.

11 (12) Side lobes of mesonotum and tibiæ reddish. *Eglanteriæ.*

12 (11) Side lobes of mesonotum and tibiæ black. *Anticus.*

13 (6) Thorax entirely black. *Chappelli.*

14 (17) Abdomen black at base and apex. Thorax entirely black. Legs marked with red.

15 (16) Abdomen red, black at base and apex. Smooth, shining, not carinated nor granulated; all the tarsi black; the tibiæ in part red. *Palustris.*

16 (15) Abdomen with the third, fourth, and part of second and fifth segments red, scarcely shining, very finely granulated, keeled in the middle; the base of four anterior femora and anterior tibiæ and tarsi entirely red. *Dubius.*

17 (30) Abdomen entirely black.

18 (27) Thorax entirely black; femora and tibiæ more or less red.

19 (24) Posterior legs marked with red; tegulæ black.

20 (23) Cerci black; femora for the greater part black.

21 (22) Mesonotum smooth, shining, impunctate. *Gonagra.*

22 (21) Mesonotum punctured, scarcely shining; parapsides not dilated behind. *Puncticollis.*

23 (20) Cerci red; femora for the greater part red. *Liogaster.*

24 (19) Hind legs entirely black.

25 (19) Tegulæ red; wings hyaline. *Scoticus.*

26 (25) Tegulæ black; wings fuscous at apex. *Gessneri.*

27 (18) Thorax more or less sanguineous; legs black.

28 (29) Mesonotum red. *Sanguinicollis.*

29 (28) Mesonotum black. *Hœmatodis.*

30 (17) Head, thorax, legs and abdomen entirely black or bluish-black.

31 (34) Middle lobe of mesonotum oval or U-shaped at base.

32 (33) Transverse radial nervure interstitial. *Coracinus.*

33 (32) Transverse radial nervure not interstitial. *Anthracinus.*

34 (31) Middle lobe of mesonotum V-shaped at base.

35 (36) Mesonotum opaque, roughly punctured all over; cenchri large, clear ivory-white. *Fissus.*

36 (35) Mesonotum shining, not punctured all over, cenchri of medium size.

37 (42) Vertex without distinct sutures.

38 (39) Wings infuscated; antennæ distinctly thickened from third joint, not attenuated at the apex. *Tinctipennis.*

39 (38) Wings hyaline; antennæ attenuated at the apex.

40 (41) Vertex and mesonotum almost glabrous, the puncturation on lateral lobes indistinct. *Oblongus.*

41 (40) Vertex and mesonotum densely pilose, the puncturation on lateral lobes distinct. *Megaptera.*

42 (37) Vertex with distinct sutures.

43 (46) Recurrent and transverse nervures, lower part of stigma and hind spurs white.
44 (45) Transverse radial and recurrent nervures in hind wings interstitial. *Varispinus.*
45 (44) Transverse radial and recurrent nervures in hind wings not interstitial.
46 (47) Lateral lobes of mesonotum almost impunctate; mesonotum subglabrous; hind spurs black. *Possilensis.*
47 (46) Lateral lobes of mesonotum punctured; mesonotum densely pilose; hind spurs pale. *Intermedius.*
48 (43) Recurrent and transverse nervures black; hind spurs mostly black.
49 (50) Wings smoky at apex; cenchri fuscous. *Niger.*
50 (49) Wings hyaline; cenchri white.
51 (52) Cerci red; antennæ long, filiform; stigma pale on lower side. *Elongatus.*
52 (51) Cerci black; antennæ short; vertex with a distinct bluish tinge. *Æneus.*

1. DOLERUS PALMATUS.

Dolerus palmatus, Klug, Berl. Mag., viii, 236; Ste., Ill, vii, 87, 6; Htg., Blattw., 235, 16; Thoms., Hym. Scand., i, 279, 1; Cam., Fauna, 49; André, Species, i, 271; Cat. 34,* 26.

Black; head and pleuræ covered with a long grey pile; mesonotum very shortly pilose and pretty deeply and coarsely punctured throughout. Vertex opaque, finely punctured; upper part of pleuræ punctured, but not so deeply as the mesonotum. Clypeus deeply incised. Cenchri large, clear white. Legs black, covered with a short, whitish pile; anterior tibiæ and tarsi fuscous; knees and anterior tibiæ in front dull white; calcaria yellowish-white; the tarsal joints pale at the extreme apex. Wings hyaline; costa and stigma fuscous; tegulæ pale fuscous. Antennæ short.

The ♂ has the abdominal segments marked with thin white lines at the junction of the segments; above there is a long thin white line on the first, second, and third and at the apex, and a large membranous one on the centre of the fourth and fifth, sometimes also on the sixth.

Length nearly 4 lines.

This scarce species is readily known from all the others by the white colour on the legs.

I have seen a ♂ taken by Dr. Sharp at Dalry, and Stephens records it from Hertford and Darenth Wood.

Continental distribution: Sweden, Germany, France.

2. DOLERUS VESTIGIALIS.

Dolerus vestigialis, Klug, Berl. Mag., viii, 305, 242; Htg., Blattw., 236, 22; Evers., Bull. Mosc., xx, 24, 10; Ste., Ill., vii, 88, 9; Thoms., Hym. Scand., i, 280, 2; Cam., Fauna, 17, 6; André, Species, i, 272; Cat. 34,* 28.
— *rufipes*, Lep., F. Fr., pl. 9, fig. 5; Mon., 124, 367. ?

Black; abdomen shining; thorax semi-opaque; the whole of the femora, four anterior tibiæ, and hinder tibiæ at the base, red; vertex and upper part of pleuræ strongly and roughly punctured; mesonotum punctured, but scarcely so deeply and roughly as the pleuræ; breast finely punctured. Antennæ short, thick, attenuate at the apex; third joint longer than fourth. Abdomen shining, smooth, the apical segments whitish at the junction; on the back of the second and third at the junction, are two small white marks. Tegulæ black, grey, or white; labrum rarely white; palpi pale red. Wings whitish hyaline, costa and stigma black. ♀ and ♂.

Length 3½—4 lines.

I have taken this insect (which does not seem to be very common) at Dunham Park, Cheshire, and Mr. Bridgman takes it at Norwich.

3. DOLERUS TRIPLICATUS

Dolerus triplicatus, Klug, Berl. Mag., viii, 295, 221; Htg., Blattw., 232, 4; Eversmann, Bull. Mosc., xx, 23, 3; Thoms., Hym. Scand., i, 286, 16; André, Species, i, 263; Cat., 32,* 3.
? — *trimaculatus*, Lep., Mon., 121, 358.
Dosytheus triplicatus, Ste., Ill., vii, 84, 8.
Dolerus lugubris, Gim., Bull. Mosc., 1844, 125.

Yellowish-red; antennæ, head, breast and lower edge of the pleuræ, three large marks on the mesonotum, and metanotum between the cenchri black. Head and thorax densely covered with a greyish pile; head deeply and coarsely punctured, the punctures on the mesonotum are scattered and fine, on the breast deep and rather coarse; antennæ shorter than the abdomen. Wings with a faint fuscous tinge; tegulæ red in front, black behind. ♀ and ♂.

Thomson describes the ♂ as having the basal segment of the abdomen black, but this is not the case with the specimen I have seen, which does not differ materially in coloration from the ♀.

Length 4¾ lines.

Easily recognised from the other British species by the three black marks on the mesonotum.

The only British example of this insect that I have seen was one taken by the Rev. T. A. Marshall in England, but I do not know the exact locality; those in Stephens's collection were taken in the neighbourhood of London.

Continental distribution: Sweden, Germany, Holland, France, Switzerland, Russia.

4. DOLERUS LATERITIUS.

♀ *Dolerus lateritius*, Klug, Berl. Mag., viii, 295, 220; Htg., Blattw., 232, 3; Evers., Bull. Mosc., xx, 23, 2; Thoms., Hym. Scand., i, 287, 17; André, Species, i, 262; Cat., 32,* 1; Cam., Fauna, 17, 2.

♂ — *madidus*, Klug, Berl. Mag., viii, 298, 223; Htg., Blattw., 233, 8; Evers., Bull. Mosc., xx, 23, 4.

Dosytheus lateritius, Ste., Ill., vii, 82, 3.

— *madidus*, l. c., 84, 8.

Black; head and thorax covered with a dense greyish pile, breast and mesonotum in the middle finely punctured and shining; pleuræ with large but not very deep roundish punctures; prothorax, tegulæ, the apical half of the mesopleuræ and mesonotum (save the scutellum which is black) reddish; abdomen dilated, smooth and shining, reddish-yellow; sheath of saw black. Antennæ shorter than the abdomen. Wings almost hyaline.

The ♂ has the thorax quite black, antennæ longer than the abdomen, which has the second to the sixth segment banded with reddish-yellow.

Length 5—5½ lines.

This insect is rather like 3-*plicatus* in form and general coloration, but it may be easily distinguished by observing that the mesonotum bears no black, while the scutellum and the metanotum are black, the opposite being the case with 3-*plicatus*, which has besides the pleuræ, red along their whole extent, instead of only the anterior part.

A commonly distributed species. It has been taken in Aberdeenshire (Trail), Clydesdale, Glanvilles' Wootton, and in the London district.

On the Continent it is found in Sweden, Germany, Holland, France, Switzerland, Russia.

5. DOLERUS FULVIVENTRIS.

Pl. IX, fig. 7 ♀, 9 ♂.

Tenthredo fulviventris, Scop., I. C., 736; Schr., En., 337, 679; Vill., E. P., 64.
— *pratensis*, Fall., Acta, 1808, 64.
— *pedestris*, Pz., F. G., lxxxii, fig. 11.
— *eglanteriæ*, Fab., E. S., ii, 109, 19; Spin., Ins, Lig., ii, 155, 38.
— *germanica*, Pz., F. G., lii, fig. 4; Fab., E. S., ii, 116, 43; Spin., Ins. Lig., i, 56; Vill., E. P., ii, 76; Schaef., Ic., t 62, fig. 89.
Hylotoma eglanteriæ, Fab., S. P., 25, 18.
Dolerus eglanteriæ, Lep., Mon., 120, 356; Klug, Berl. Mag., viii, 291, 218; Htg., Blattw., 232, 1; Evers., Bull. Mosc., xx, 22, 1.
— *germanicus*, Lep., Mon., 121, 359.
— *bajulus*, Lep., Mon., 121, 357.
— *pratensis*, Thoms., Hym. Scand., i, 284, 10; Cam., Fauna, 17, 1; André, Species, 1, 263; Cat., 33,* 14.
Dosytheus eglanteriæ, Ste., Ill., vii, 82, 1.
— *hyalinis*, Ste., l.c., 83, 4.
— *fulviventris*, Ste., l.c., 83, 5.
— *bajulus*, Ste., Ill., l.c., 83, 6.
— *xanthopus*, Ste., l.c., 83, 7.

Head covered with a greyish pile, punctured, opaque, frontal sutures invisible; pleuræ opaque, covered with a close, depressed pile, and with deep irregular punctures; middle lobe of the mesonotum scarcely punctured, smooth, shining; lateral lobes and scutellum with a fine punctation. Antennæ shorter than abdomen, somewhat attenuated at the apex. Head and antennæ black. Thorax with the sides, breast, scutellum and metanotum, black, the rest of the thorax and tegulæ red. Abdomen reddish, basal joint black. Legs black; apex of femora and tibiæ more or less reddish. Wings subhyaline, with a blackish tinge; nervures and costa black.

Length 3—3¼ lines.

The above is a description of the commonest form, but numerous varieties occur. The scutellum may be red, a common aberration has a black mark on the middle lobe of the mesonotum, the latter and the pronotum are not unfrequently marked with black. In rare cases the apical abdominal segments are spotted with black, while the legs may be totally black, or have the femora and tibiæ almost wholly red.

The ♂ has the thorax wholly black, as well as the three or four apical abdominal segments. It has usually the posterior tibiæ red, except at the extreme apex.

An exceedingly common species, found everywhere among horsetails in June and July. The larvæ probably feed on these plants. It is a species spread widely over Europe.

Obs.—Thomson adopts the name of *pratensis*, Lin., for this species, but I have not followed him in this, not being satisfied as to the identity of the two, especially as in the Linnean collection *pratensis* is represented by *Dolerus tristis*, Kl.

Tenthredo abietinus, Lin., is represented in the collection by *Dolerus timidus*, Kl.

6. DOLERUS ANTICUS.

Dolerus anticus, Klug, Berl. Mag., viii, 292, 219; Htg., Blattw., 232, 2; Thoms., Hym. Scand., i, 287, 18; André, Species, i, 265; Cat., 32, 4.
— *ferrugatus*, Lep., F. Fr., pl. 9, fig. 1; Mon., 122, 361.
Dosytheus anticus, Ste., Ill., vii, 82, 2.

Black; densely covered on the head and thorax with a long, grey pile; vertex and mesonotum finely punctured, mesopleuræ covered with deep, roundish punctures, middle lobe of the mesonotum scarcely punctured; antennæ a little longer than the abdomen, the middle joints somewhat thickened; prothorax, middle lobe of mesonotum, tegulæ and abdomen red; the basal segment of abdomen and the sheath of saw black. Wings hyaline; nervures, costa and stigma black.

The ♂ has the antennæ scarcely double the length of the head, and the abdomen narrowly banded with red in the middle (*teste* Thomson).

Length 4½—5 lines.

Anticus closely resembles *lateritius*, but is smaller, and is more deeply punctured; the middle lobe only of the mesonotum is red, and scarcely any of the pleuræ, the first abdominal segment too being black, while in *lateritius* it is reddish, nor is the abdomen so much inflated as in the last mentioned species.

The only British localities I know for *anticus* are those mentioned by Stephens—Ripley and near Hereford—and Worcester, where it has been taken by Mr. Fletcher.

Continental distribution: Sweden, Germany, Holland, France, Switzerland.

7. DOLERUS CHAPPELLI.

Pl. IX, fig. 8 ♀.

Dolerus Chappelli, Cameron, E. M. M., xiv, 155; André, Species,
i, 204; Cat., 33,* 15.

♀ dull black, with a faint bluish tinge, densely covered with a pale pubescence, deeply and coarsely punctured. Abdomen from the second segment reddish-yellow; the sheath of the saw black. Wings subhyaline; costa, stigma and nervures black.
Length 4½ lines.

The nearest ally of this insect is *D. anticus*, but it has the clypeus more deeply incised, pubescence thicker and closer, abdomen more sharply pointed, pleuræ less shining, and the whole of the first abdominal segment with the tegulæ, pronotum and mesonotum black.

A single specimen has been taken by Mr. Joseph Chappell in Staffordshire.

8. DOLERUS PALUSTRIS.

Dolerus palustris, Klug, Berl. Mag., viii, 296, 222; Htg., Blattw., 233, 6; Thoms., Hym. Scand., i, 283, 9; Cam., Fauna, 17, 3; André, Species, i, 267; Cat., 33,* 11; Fitch, Proc. Ent. Soc., 1881, xxii.
? — *uliginosus*, Kl., Berl. Mag., viii, 297, 223; Htg., Blattw., 233, 7 (ab.).
Dosytheus junci, Ste., Ill., vii, 84, 11.

Black; the second and sixth at the base and apex respectively, and the intermediate segments of the abdomen, with the knees and tibiæ (except at the apex), red; mesonotum and breast finely punctured; tegulæ black. Wings subhyaline, having a fuscous tinge; the basal segments of abdomen smooth, shining. ♀ and ♂.
Length 3½—4 lines.

Ab.—*a.* Posterior tibiæ black; anterior brownish in front, or entirely black, and the abdominal band of a darker red, sometimes marked with black, and the mesonotum duller (*uliginosus*).

Ab.—*b.* Hinder tibiæ fuscous; antennæ brownish beneath.

The nearest ally of *palustris* is *equiseti*, Kl., which differs from it in having the tegulæ and the femora, tibiæ and tarsi red. From *pratensis* it differs, of course, in coloration, and the puncturing, too, is weaker. The neuration is subject to considerable malformation in both sexes.

A very common species, found in most localities in June.

The larva is cylindrical, the skin in folds. Head black; the face and the sides, a little from above the eyes, white; a semicircular black mark in the middle of the face. Upper part of the body dark drab-black, lighter on the centre of the back; the sides from a little above the spiracles white or greenish-white; anal segment white. The eyes are in the black portion of the head, but the sides behind them are white. Legs white; a black mark over the thoracic. The spiracles are blackish.

It feeds in August on *Equisetum palustre* and *limosum*, eating from the top downwards, and frequently from the inside of the stem. No cocoon was spun in my breeding cage.

Continental distribution: Sweden, Germany, Holland, France and Switzerland.

9. DOLERUS DUBIUS.

Dolerus dubius, **Klug, Berl. Mag., viii, 299, 228; Htg., Blattw., 234, 11; Evers., Bull. Mosc., xx, 23, 5; Thoms., Hym. Scand., i, 282, 7; André, Species, i, 266; Cat., 33,* 9.**
Dosytheus dubius, **Ste., Ill., vii, 85, 13.**

Black; second and fifth segments of abdomen, at the base and apex respectively, the third and fourth wholly, and the knees, apex of four anterior femora, and tibiæ and tarsi red; apex of tarsi fuscous. Antennæ shorter than the abdomen. Mesonotum finely and closely punctured; pleuræ with deep, roundish punctures; first abdominal

segment punctured; dorsum of abdomen bluntly carinated. Wings hyaline; nervures black; stigma brownish on the lower side; tegulæ black.

The ♂ has the abdomen narrowed considerably towards the apex, the red ring much narrower, sometimes obliterated entirely.

Length 5½ lines.

D. timidus, Kl., differs from the present species in being larger, and in having all the tibiæ and tarsi red, as well as the apical half of the femora; *D. tristis*, again, is smaller, has the posterior legs black, the anterior knees and tibiæ reddish, tegulæ reddish, head narrower, and it is also a smaller and narrower insect than *dubius*.

Stephens records *dubius* as being found rarely in July in the vicinity of London.

It is spread nearly all over the European continent; eastward as far as the Ural range, and southward to the Mediterranean; north into Sweden.

10. DOLERUS GESSNERI.

Pl. XIX, figs. 3 and 3 *a*, Saw.

Dolerus gessneri, André, Species, i, 273; Cat., 34,* 29; cf. Cam., Tr., Ent. Soc., 1881, 574.

Black; anterior knees and basal half of tibiæ and spurs red. Wings hyaline; apical half more or less fuscous. Head and thorax densely covered with a close white pile; punctured all over; more or less pilose at the sides and at apex; the segmental divisions white; basal segment punctured. Cenchri cream coloured. Antennæ as long as the abdomen, thickened, but not very much, from third joint, scarcely attenuated at the apex; third joint considerably longer than the fourth. The scutellum has the puncturation not so distinct as the mesonotum.

Length 4¾—5 lines.

Ab.—a. Fore legs entirely black.

Of the same size and almost similarly coloured as *D. niger*, but is easily known by the absence of sutures in the vertex, by the thicker antennæ, more deeply and uniformly punctured mesonotum, clearer coloured cenchri and appendiculated accessory nervure in hind wings. Its nearest ally is *D. tinctipennis*, with which it agrees in the general form of the saw, but that species, again, is smaller, has the legs always black, the antennæ shorter and more distinctly thickened from third joint, mesonotum almost smooth and shining, &c.

Rare. Cladich, Loch Awe in June.

Switzerland.

11. Dolerus scoticus.

Pl. XIX, fig. 1, Saw.

Dolerus scoticus, Cam., E. M. M., xvii, 206 (1880).

Black; tegulæ, four anterior knees and apex of tibiæ reddish; the red on the middle legs being more obscure than on the front pair. Head, thorax and apex of abdomen covered with a long white pubescence. Head, pleuræ and mesonotum punctured all over. Antennæ nearly as long as the abdomen, scarcely attenuated at apex. Wings hyaline; costa and stigma black, the latter pale on the underside. ♀.

Length 3½ lines.

Agrees with *puncticollis* in the punctured mesonotum, but the puncturing is more distinct, body shorter, abdomen more inflated, antennæ longer, and the radial nervure is received further from the second cubital.

A rare species. Taken by Dr. Sharp at Braemar in June.

12. Dolerus tinctipennis.

Pl. XIX, fig. 2, Saw.

Dolerus tinctipennis, Cam., Tr., Ent. Soc., 1881, 574.

Deep black, shining, covered on head and thorax with a close, white and long pubescence; head and mesonotum punctured, the head roughly, scutellum and middle lobe clearly, but not deeply nor closely, the lateral lobes on inner sides faintly, and on outer scarcely at all. Sutures on vertex scarcely visible. Antennæ not much longer than abdomen; third joint not much thinner than the following and one-fourth longer than the fourth joint, which is a very little longer than the fifth; the joints from the fourth distinctly thickened; two apical a very little thinner than the preceding, but still thicker than the third. Cenchri large, greyish white. Base of abdomen smooth, unpunctured. Wings with deep black nervures and stigma; apical half in both wings smoky brown; inner half almost hyaline; accessory nervure in hind wings shortly appendiculated; the transverse median nervure is received a little in front of the middle of cellule. Spurs longish; four anterior fuscous; posterior deep black.

Length 3½ lines.

The deep black colour, antennæ distinctly thickened from the third joint, and black-tinted wings separate readily this species.

Rare. London district.

13. DOLERUS GONAGRA.

Pl. IX, fig. 10 ♀, 11 c ♂ organs.

Tenthredo gonagra, Fab., E. S., ii, 117, 48; S. P., 34, 25; Pz., F. G., lxiv, fig. 6.
— *crassa*, Scop., I. C., 730; Schrank, En., 328, 659; Pz., F. G., lxv, fig. 14 (♀); Vill., E. P., ii, 54; Spin., Ins. Lig., i, 56, 11.
— *erythrogona*, Schr., En., 338, 681; Vill., E. P., 65.
— *geniculata*, Fourc., I. P., ii, 313, 74.
Dolerus gonager, Kl., Berl. Mag., viii, 305, 241; Lep., F. Fr., pl. 9, fig. 6; Mon., 124, 370; Ste., Ill., vii, 88, 8; Htg., Blattw., 236, 21; Evers., Bull. Mosc., xx, 24, 9; Thoms., Hym. Scand., i, 285, 13; Kalt., Pfl., 746 (lar.); Cam., Fauna, 17, 5; André, Species, i, 274; Cat. 34,* 37.
? — *femoratus*, Evers., Bull. Mosc., xx, 24, 11.

Black, shining; knees broadly red; vertex and upper side of pleuræ strongly punctured; mesonotum slightly punctured, smooth, shining. Parapsides dilated. Abdomen with the edges of the segments white. Antennæ a little shorter than the abdomen, very slightly attenuated at the apex. ♂ and ♀.

Length 4—5 lines.

This is a larger, broader and more robust looking insect than *D. vestigialis*. It has the puncturing on the mesonotum and pleuræ much less distinct, parapsides more dilated; antennæ, if anything, longer and thicker at the apex; the legs have not so much red; anterior tibiæ are black, while in the other species they are red; eyes are emarginated, nor has it the white marks on the second and third abdominal segments observed in *vestigialis*.

Kaltenbach says (l. c.) that he bred this species out of larvæ which fed in June and July on different meadow grasses, and especially on *Festuca pratensis*.

A very common species found everywhere throughout Europe.

14. Dolerus puncticollis.

Dolerus puncticollis, Thoms., Hym. Scand., i, 286, 14; Cam., E. M. M., xvi, 249; André, Species, i, 274; Cat., 34,* 36.

Black; the tip of the abdomen aeneous, apical fourth of the anterior, and the half of the posterior femora, and basal fourth of tibiæ red; calcaria pale; head and thorax covered with a thick griseous pubescence; the head, except two shining lines on each side behind the ocelli, and the whole of the mesonotum deeply punctured.

Length 4¼ lines, alar. exp. 9¼ lines.

A Scotch specimen differs from the above description (taken from a specimen taken near Plymouth by Mr. Bignell) in having three-fourths of the hinder femora red, calcaria darker, while the tip of the abdomen wants the steel-blue tinge.

It is about the same size and has the same coloration as *gonagra*, but it has the antennæ shorter, and, if anything, thicker; the puncturing on the head is deeper, while it extends all over the mesonotum, besides being much more rugged; nor are the parapsides so much dilated.

Besides the above two examples, it has been taken by Mr. Bridgman at Norwich, and it would appear to be rarer than *gonagra*, with which it is no doubt confounded. Sweden is the only continental locality from which it has been recorded.

15. Dolerus liogaster.

Dolerus liogaster, Thoms., Hymen. Scand., i, 286, 15; Cam. E. M. M., xvi, 249; André, Species, i, 270; Cat., 34*, 35.

Black; femora, apex of tibiæ and cerci red; head deeply punctured all over, mesonotum also punctured, but the puncturing is not so

rugged as on the head; abdomen smooth, shining, the basal segments almost glabrous, and with a few minute blisters on the surface. Head and pleuræ densely covered with a grey pile; mesonotum slightly pilose, as is also the apical segments of the abdomen. ♀ and ♂.

Length 4¾ lines.

Readily distinguished from the two preceding species by the colour of the femora and cerci. *D. vestigialis* agrees with it in having reddish femora; but the eyes are oblong, cerci black, while it has also white markings on the abdomen.

Rare, appearing end of May and early in June in Clydesdale.

Sweden is the only continental country from which it has been recorded.

16. DOLERUS HÆMATODIS.

Pl. I, fig. 5, larva.

Tenthredo hæmatodis, Schr., En., 338, 678; Vill., E. P., 63; Rossi, M., 240.
— *opaca*, Fab., E. S., ii, 120, 62; S. P., 38, 42; Pz., F. G., lii, fig. 10; Vill., E. P., 83; Spin., Ins. Lig., i, 58, 17.
— *collaris*, Don., B. E., xiii; pl. 441, fig. 1.
Dolerus hæmatodis, Klug, Berl. Mag., viii, 304, 238; Ste., Ill., vii, 86, 1; Htg., Blattw., 235, 18; Evers., Bull. Mosc., xx, 23, 5; Thoms., Hym. Scand., i, 289, 21; Cam., Fauna, 17; Voll. Tidj. Ent., xxiii, 14; pl. 3, *a*, *b*, *c* (lar.); André, Species, i, 269; pl. xv, fig. 3; Cat., 32,* 6.
— *opacus*, Jur., Hymen., 58, pl. 6; Lep., F. Fr., pl. 9, fig. 7; Mon., 125, 372.
— *cœrulescens*, Htg., Blattw., 242, 36 ♂.
— *micans*, Zad., Beschr., 18.

Deep bluish-black, shining; vertex deeply punctured; the depressions on each side of ocelli shining and connected by a furrow placed behind the ocelli, the space bounded by the furrows being raised; mesonotum covered with a fine punctation; pleuræ deeply punctured, as deep, if not deeper, than the vertex; the head and thorax covered with a fine, close, rather long white pubescence; the abdomen has a deeper bluish tinge than the head and thorax; the basal segments are smooth, shining, glabrous; the apical half covered with a long white pubescence. Tegulæ and pronotum pale red. Antennæ as long as the abdomen; apical joints much thinner than the others. Wings hyaline;

costa and stigma black, the latter with the lower half occasionally fuscous.

Length 4½—5 lines.*

This species is easily known by the colour of the tegulæ and pronotum. As Zaddach has remarked, the abdomen changes its form very much when dried.

The ♂ wants the red colour on thorax entirely, the antennæ are slightly shorter than the body and dull black, the head is more narrowed behind, and there is on the eighth abdominal segment in front a short keel.

The larva feeds on various species of *Juncus*, and I have also seen it on *Scirpus lacustris*, but possibly this may have been accidentally. It is very like the larva of *D. palustris* in form and coloration, having the upper part of the body black, the sides and belly white, with a greenish tinge, a more or less well-developed mark over each of the thoracic legs, and the head with more or less of the vertex and the eyes black.

It is found in June and July, and pupates in the earth without spinning a cocoon.

It is a tolerably common form, appearing at the end of May and June. In Scotland it has been found near Glasgow and at Aberdeen (Trail), and in England, in the Midland Counties, Worcester, Devonshire, Norfolk, and the London district.

It is found throughout all the European subregion.

Obs.—Zaddach (l. c.) is not quite sure as to *cœrulescens* being the ♂. He describes the ♂ as having the antennæ fuscous and longer than the body, their length being, however, subject to some variation. Zaddach says further that the ♂ is recognised from that of *D. nigra* by having the head smaller and more elegantly formed, and distinguished also in that the pad-like elevation projects from the round and raised vertex on each side, and behind is limited by a furrow running parallel with the hind border, and before through a similar low furrow, it being for the most part smooth, shining, and bluish black.

17. DOLERUS SANGUINICOLLIS.

Dolerus sanguinicollis, Klug, Berl. Mag., viii, 305, 240; Htg., Blattw., 236, 20; André, Species, i, 270; Cat., 34,* 25.

Bluish-black; pronotum, tegulæ, middle lobe of mesonotum at the sides, lateral ones save a small spot near the tegulæ, red. Antennæ short; abdomen smooth, shining; the segments bordered with white. Tibiæ and tarsi dull black. Wings brownish; costa and stigma dull black.

Length 3½ lines.

Similar to *hæmatodis*, but smaller, the bluish tinge is much more decided, antennæ shorter, punctation more distinct, and the wings darker. I have seen one specimen in Shuckard's collection.

Continental distribution: Germany, Spain.

18. DOLERUS CORACINUS.

Pl. XIX, fig. 4, Saw.

Dolerus coracinus, Klug, Berl. Mag., viii, 302; Ste., Ill., vii, 87, 4; Htg., Blattw., 238, 28; Evers., Bull. Mosc., xx, 25, 15; Thoms., Hym. Scand., i, 292, 26.

— *nitens*, Zad., Beschr., 16; André, Species, i, 277, 57; Cat., 35,* 43.

Bluish-black, shining; head and thorax covered with a greyish pile. Vertex deeply punctured, the two sutures short but deep. Mesonotum smooth, shining, middle lobe (save at apex), and the posterior three-fourths of the scutellum finely punctured, the punctures shallow and wide apart; the middle suture deep, semicircular at the apex. Cenchri moderately large, cream coloured. Abdomen smooth, shining, glabrous, slightly keeled. The apex shortly pilose. Legs covered closely with a grey pile, calcaria black. Antennæ shorter than the abdomen, somewhat thickened in the middle; third joint a little longer than the fourth. Wings subhyaline, with a faint brownish tinge; costa and stigma blackish-fuscous, transverse radial nervure joined to the second transverse cubital.

Length 4¼ lines.

The ♂ has the antennæ as long as the body, the greenish-blue tint of the body appears more decided; abdomen smooth and shining. The middle lobe of mesonotum is more sharply pointed at the apex than in the ♀.

Distinguished from all the other British species (save *Anthracinus*) by the semicircular middle lobe of mesonotum, and shining, brilliant, bluish-black body. *D. varispinus*, which agrees with it in the neuration, differs, *inter alia*, in the thicker stigma, shorter antennæ, longer cerci, and pale spurs.

Rare. Manchester district (Chappell). South of England.

Continental distribution: Sweden, Germany.

19. DOLERUS ANTHRACINUS.

Pl. XIX, fig. 5, Saw.

Dolerus anthracinus, Klug, Berl. Mag., viii, 302, 233; Htg., Blattw., 238, 27; Zad., Beschr., 16.

Similar to *Coracinus*, but the body darker, the bluish tinge not so conspicuous, body broader compared to its length; transverse radial nervure received at a little distance from the second transverse cubital; transverse median nervure received nearer the basal, while in *Coracinus* it is received in the middle of the cellule; and the stigma is pale on lower edge. If anything, the head is stouter; cenchri darker, blotch narrower at the apex.

The ♂ has the antennæ a little longer than the abdomen (*teste* Zaddach).

Length 4 lines.

This is apparently the *anthracinus* of Klug and Zaddach, the description of the latter being taken from original type (♂) in the Berlin Museum. The ♀ described by Klug, however, is different; it is *carbonarius*, Zad., a species related to *fissus*. Hartig's *anthracinus* is perhaps different, for he says that the middle lobe of mesonotum is triangular at the apex as in *niger*. Thomson's *anthracinus* is also different, it apparently = *oblongus*, M.

Rare. A single specimen from near Manchester (Dunham Park).

Continental distribution: Germany.

20. Dolerus fissus.

Pl. VI, fig. 3, lar.; Pl. XVIII, figs. 7 and 8, Saw.

Dolerus fissus, Htg., Blattw., 243, 37 ♂; Zad., Beschr., 24; André, Species, i, 279, 13; Cat. 35,* 48.
Dolerus leucobasis, Htg., Blattw., 240, 31, ♂ (ab.).
? — *planatus*, Htg., Blattw., 243, 39, ♂.
— *cenchris*, Htg., Blattw., 240, 32 ♀; Evers., Bull. Mosc., xx, 25, 16; Thoms., Hym. Scand., i, 290, 24; Cam., Fauna, 49.

Black; covered with a short grey pile; head thick, strongly punctured; sutures on the vertex almost invisible. Antennæ scarcely as long as the abdomen; middle joints somewhat thickened; third joint a little longer than the fourth. Mesonotum strongly punctured throughout, almost opaque; sutures moderately deep; cenchri large, ivory white. Abdomen smooth, shining, almost glabrous at the base, pilose from the fourth segment; blotch long and narrow, segments edged with white, sometimes quite black. Wings hyaline; costa and stigma black, the latter sometimes pale on the lower side.

The ♂ has the antennæ longer than the abdomen, the abdomen rather wide; the two apical segments with a white membranous spot in the middle; the three basal segments smooth, almost glabrous, the rest densely pilose.

Length 4¼—4¾ lines.

Easily known by the mesonotum being uniformly and strongly punctured all over, and by the large ivory-white cenchri.

The larva of *fissus* has been described by Zaddach (l. c., p. 15). He says that he found it in June feeding on grass. It was of a greyish-white colour, with the back of a darker grey and the head yellowish. Unfortunately it buried itself in the earth before a minute description of it could be taken. I also bred it from a larva (the same, I believe, as that figured in Pl. VI, fig. 3) which fed on *Festuca.*

Fissus is a common British species. I have found it in the Glasgow districts, Perthshire, Inverness-shire and Sutherlandshire; while Mr. Hardy has captured it in Berwickshire. I have seen English specimens from Manchester, Worcester, Glanvilles' Wootton, York, Norwich, and the London district.

On the Continent it has been recorded from Sweden, Germany, France and Russia

21. DOLERUS MEGAPTERUS.

Pl. XIX, fig. 7, Saw.

Dolerus megapterus, Cam., Tr., Ent. Soc., 1881, 574.

Black; head and thorax opaque, densely covered all over with close, longish grey hairs, which give the part a greyish appearance; closely punctured all over. Antennæ not much longer than the head and thorax, short, thick, last joint distinctly thinner than eighth, third much longer than fourth. Cenchri dull grey. Breast and pleuræ opaque, covered with a long grey pile. Abdomen smooth and shining, basal segment with a few scattered punctures; the sides and belly covered with a whitish pubescence, which, however, is not so long as that on the thorax. Tibiæ and tarsi densely pilose; spurs fuscous, posterior darker. Wings almost hyaline, large; nervure and stigma black; transverse cubital, radial and recurrent nervures white in the middle. Transverse median nervure received before the middle of the cellule; accessory nervure in hind wing almost interstitial.

Length 4¼ lines.

Slightly larger than *fissus*; antennæ shorter, thicker and not so attenuated at the apex; puncturing on thorax not so deep, while the pile is longer and thicker; head broader; transverse median nervure is received nearer the base than apex of the cellule, the contrary being the case with *fissus*, and the cenchri smaller and dull grey.

Rare. Manchester district.

22. DOLERUS OBLONGUS.

Pl. XIX, fig. 6, Saw.

Dolerus anthracinus, Thoms., Hym. Sc., i, 291, 25; *exc. syn. non.* Klug.

Black, shining; head deeply punctured; the middle and lateral lobes, except on the extreme outside, and scutellum finely punctured; abdomen smooth, shining; basal segment with a few scattered punctures; blotch distinct. Head and thorax covered with a very slight, microscopic, scattered down; abdomen glabrous; cenchri brownish-white. Calcaria long, sharp, more or less white on all the legs. Antennæ shorter than the abdomen, the apical joints a little thinner than the middle ones; third joint distinctly longer than the fourth. Wings hyaline; stigma brownish on the lower side; transverse radial and second recurrent nervure white; transverse median nervure received before the middle of cellule; accessory nervure in hind wing interstitial.

Length 4 lines.

Not unlike *varispinus*, but the head is broader and more closely punctured; the puncturation on the mesonotum is pretty much the same in both species, but the head and thorax is almost glabrous in *oblongus*, the sutures on vertex are invisible, antennæ longer and thicker, and the accessory nervure in hind wings interstitial, and, as a whole, it is a broader insect. It comes near to *D. megapterus*, but that species is larger and longer compared to the breadth, has the head and thorax densely covered with long grey hair, so that these parts are without gloss, while in *oblongus* they are shining; the mesonotum is more densely punctured, and the spurs and stigma quite black. From *intermedius* it may be separated by its broader body and head, by the deeper puncturation on middle lobe, darker cenchri, much longer spurs and metatarsus, which is not so much thickened at the apex, and is as long as the two following joints.

Seemingly a northern and not very common species. Braemar, Rannoch, Clydesdale.

Continental distribution: Sweden.

23. DOLERUS POSSILENSIS, sp. n.

Pl. XIX, fig. 8, Saw.

Black, head with a bluish tinge; head covered with punctures, not very closely pressed together; scutellum and middle lobe of mesonotum punctured, but not so closely nor so thickly as the head, base of scutellum and lateral lobes almost impunctate; head and pleuræ pilose, more especially the latter. Mesonotum sparsely pilose, almost subglabrous. Antennæ shorter than the abdomen, slightly attenuated at the apex. Cenchri greyish. Wings hyaline; transverse radial, second transverse cubital and recurrent nervures pale; stigma pale on lower border; transverse cubital and recurrent nervures in hind wings almost interstitial. Abdomen keeled on back, smooth, shining, impunctate, almost glabrous above, pilose at the sides, especially at the apex. Spurs black; anterior pale at extreme base; posterior metatarsus almost shorter than two succeeding joints, thick, especially at apex; spurs short and thick. Sutures on vertex distinct. ♀.

Length nearly 4 lines.

Very similar in sculpture and clothing to *oblongus*, but distinguished by the distinct sutures on vertex, more pilose pleuræ, body longer compared to the breadth, mesonotum less punctured, base of abdomen impunctate, metatarsus shorter, that of *oblongus* being longer than the two succeeding joints, besides not being so distinctly dilated at the apex. From *intermedius* it is readily known by the more glabrous, less punctured mesonotum, shorter and thicker spurs and metatarsus. From *varispinus* the closer puncturation on the head and mesonotum, thicker tarsal joints, broader head and black spurs separate it.

Rare. Possil Marsh, near Glasgow.

24. DOLERUS VARISPINUS.

Pl. XX, fig. 3, Saw.

Dolerus varispinus, Htg., Blattw., 239, 30; Thoms., Hymen. Scand., i. 292, 27; André, Species, i, 278, 61; Cat., 35,* 45.
— *brevitarsis*, Htg., l. c., 243, 38 (♂).

Deep black, shining; covered on head and thorax with short pale pubescence, as well as on the sides and apical segments of the abdomen. Abdominal segments thinly edged above and beneath with white; the two apical segments with much wider white borders. Head covered with shallow scattered punctures; the space surrounding the ocelli more shining than the rest of the head; lateral sutures wide but shallow. Mesonotum covered all over with scattered shallow but wide punctures; those on the outer side of middle lobe being less distinct; cenchri dull grey. Wings hyaline; stigma dilated, black, paler on lower side; transverse radial nervure received close to second cubital; transverse nervures in anterior wings united or nearly so. Posterior spurs for the greater part white; middle ones dull testaceous; front dull testaceous at apex. Metatarsus dull brown at the base. ♀.

The ♂ I have never seen. Thomson describes it thus:—Abdomine longo, dorso pubescenti-opaco, subcarinato, segmento 8° dorsali spatio polito nullo.

Length 4 lines.

Agrees with *elongatus* and *æneus* in the body form, but the antennæ are shorter and thicker, stigma broader, puncturing deeper, abdomen shorter, head and thorax not so pilose. The saw is not unlike that of *coracinus* and *anthracinus*, but the teeth are not so deep, more regularly and closely indented all over from the first tooth. The transverse radial, cubital and second recurrent on the upper side are milk white. The accessory nervure in hind wing is interstitial.

Seemingly rare. Three specimens taken at Norwich by Mr. Bridgman.

25. DOLERUS INTERMEDIUS.

Pl. XX, figs. 1 and 2, Saw.

Dolerus intermedius, Cam., Tr. Ent. Soc., 1881, 575.

Black, shining; covered with a short, scattered pubescence. Head roughly punctured; sutures on the vertex distinct and very shining; the whole of the scutellum and the middle lobe punctured, the latter with the punctures wider apart; the lateral lobes also punctured, but not so deeply, and more irregularly; cenchri large, clear ivory white. Abdomen longer than the head and thorax, bulged out in the middle; the basal segment unpunctured, the following finely shagreened; three basal segments glabrous, the rest shortly pilose; blotch large, distinct. Antennæ slightly thickened in the middle, shorter than the abdomen; third joint a little longer than the fourth; the last sharply conical. Spurs pale at the apex; hinder ones reaching to the middle of metatarsus, which is pale, curved at the base and thickened at the apex, and scarcely longer than the two succeeding joints. Wings hyaline, slightly infuscated at the extreme apex. Accessory nervure in hind wings appendiculated; costa, stigma and nervures black, save the transverse nervures, which are for the most part milk white in both wings.

The ♂ has the head and thorax more deeply punctured; antennæ thicker and as long as the abdomen and half the thorax; the third joint almost shorter than fourth.

Length 3½—4 lines.

Agrees with *varispinus* in having the lower part of stigma, recurrent and transverse nervures pale white, but it is smaller and narrower; the puncturation on head and thorax finer and closer; cenchri large and clear white; the transverse radial nervure is not received close to transverse cubital and the transverse nervures in hinder wings are wider apart. As in *varispinus* the base of hinder tarsi is generally white, but it is also black, and the spurs in some cases are blackish, in others almost wholly white. It is smaller, as a rule, than *æneus*, but it may readily be known from that species by the head wanting the bluish tinge, by the pale stigma and nervures, and shorter antennæ.

Apparently not an uncommon species in June. Rannoch, Lochaweside, Clydesdale, Dumfriesshire, Norwich, Hastings (Butler), Glanvilles' Wootton.

26. DOLERUS NIGER.

Pl. XX, fig. 4, Saw.

Tenthredo nigra, Linn., S. N., ed. xii, 925, 34; Fab., E. S., ii, 120, 64; S. P., 38, 44; Pz., F. G., lii, fig. 11; Rossi, Mant., 237; Schr., En., 336, 677; Vill., E. P., 44.
Dolerus niger, Kl., Berl. Mag., viii, 301, 232; Lep., F. Fr., pl. 9, fig. 7; Mon., 125, 371; Ste., Ill., vii, 86, 3; Htg., Blattw., 237, 25; Evers., Bull. Mosc., xx, 25, 14; Zad., Beschr., 22; Thoms., Hym. Scand., i, 289, 22; Cam., Fauna, 17, 8; André, Species, i, 276, 54; Cat., 35*, 44.

Black; covered with a long greyish pile, except on the four or five basal segments of the abdomen, which are glabrous above. Head a little narrower than the mesothorax; vertex not raised, with the sutures short, deep; vertex almost shining, punctured, but not very deeply; the front of the head opaque, and more deeply punctured than the vertex; clypeus deeply incised. Antennæ nearly as long as the abdomen; third joint a little longer than the fourth, moderately thick; apical joints much thinner than the others. Thorax shining; middle lobes of the mesonotum strongly punctured; the lateral lobes not so deeply at the sides; pleuræ opaque, strongly punctured; parapsides dilated. Cenchri dull fuscous; tegulæ black. Abdomen longer than the head and thorax; the junction of the segments marked with a very thin white line; the ninth segment ending in a long hairy tuft. Sheath projecting, hairy at the apex. Blotch distinct, much broader than long. Wings hyaline, greyish fuscous at the apex; the nervures, costa and stigma black.

The ♂ has the antennæ longer than the abdomen, the third and fourth joints equal, the greyish pile longer and thicker than in the ♀; the abdomen long; the apical lobes large; the eighth segment smooth, glabrous.

Length 5¾—6¼ lines.

The largest of the black *Doleri*. Readily known by fuscous cenchri and wings, which are smoky at the apex and sometimes throughout. Commonly distributed. I have bred a black *Dolerus* from the larva figured on Pl. VI, fig. 2, which seems to be *niger*, but as it is in bad condition and as it is a ♂ I cannot be certain about the species. It fed on *Festuca*.

Continental distribution: General.

27. DOLERUS ÆNEUS.

Pl. XX, fig. 5, Saw.

Dolerus æneus, Htg., Blattw., 241, 31; Zad., Beschr., 20; Thoms., Hym. Scand., i, 293, 28; André, Species, i, 275, 51; Cat., 34,* 38.

Deep black, with a very faint bluish tint; head, thorax and apical segments of the abdomen covered with a moderately long greyish pile. Vertex with a faint bluish tinge, deeply punctured; the two visible sutures deep, short; vertex narrow behind the ocelli. Antennæ about the length of the abdomen, slightly thickened in the middle; apical joints somewhat thinner. Mesonotum smooth, shining; sparsely punctured on the middle lobe, at the inner sides of lateral lobes and the base of scutellum; pleuræ punctured; sternum smooth, shining; both are covered with a long grey pile. Cenchri large, white; sutures of mesonotum deep. Legs with the knees pale fuscous; sometimes, also, the tibiæ are pale in front. Abdomen longer than head and thorax; basal segments are almost glabrous; apical covered with long, grey hair; blotch small, narrow. Cerci black. Wings hyaline, greyish at the apex. Nervures, costa and stigma fuscous, the latter is sometimes greyish on the lower side. The labrum and palpi are usually pale white, more rarely black or fuscous.

The ♂ has the antennæ longer than the body; the third and fourth joints subequal; vertex distinctly narrowed behind.

Length 3½—3¾ lines.

Not uncommon in Clydesdale, the Midland Counties, Norwich and the South of England generally.

Continental distribution: Sweden, Germany, Holland, France.

28. DOLERUS ELONGATUS.

Pl. XX, fig. 7.

Dolerus æneus, var., i; Htg., Blattw., 241.
— *æneus*, Zad., Beschr., 20, in part.
— *elongatus*, Thoms., Hym. Sc., i, 293, 29; Cam., Fauna, 18, 9; André, Species, i, 276; Cat., 34,* 39.

Black; covered with a longish white or griseous pile; the vertex with a faint bluish tinge, sparsely punctured. Mesonotum smooth, shining;

lateral lobes and scutellum very sparsely and indistinctly punctured; parapsides dilated; cenchri dull white; basal segment of abdomen impunctate; cerci red. Wings hyaline; stigma pale on lower side. Antennæ longer than abdomen, filiform. The four anterior spurs pale.

The ♂ has the antennæ as long as the body; the puncturation on head and thorax closer; the head narrower behind.

Length 4—4½ lines.

Closely allied to *æneus*, but it is larger, more elongated, has longer antennæ in both sexes, the post costal cellule is, if anything, wider and the cerci red. As a whole it has more of a bluish tinge than *æneus;* in one or two of my Scotch specimens the apical segments of abdomen are very distinctly steel blue, these specimens, too, having the colour of the mouth, joints of the legs and stigma darker than usual. Thomson describes the transverse radial nervure as interstitial, but this is the case only with one specimen that I have seen.

Common in Scotland, extending to the extreme north and to the Hebrides, and occurring at an elevation of 3000 feet and upwards on mountains. It is found also in the North of England.

Sub-tribe SELANDRIADES.

Antennæ short, filiform, rarely thickened at apex; the third joint rarely equal to and generally longer than fourth; 7- to 15-jointed. Wings with two radial and three or four cubital cellules; basal nervure received near or joined to the cubital. Lanceolate cellule petiolate, contracted, open, or with an oblique cross nervure. Hind wings with the transverse cubital and recurrent nervures present, or the transverse cubital may be absent and the recurrent present, or both may be absent. Legs generally short; calcaria never reaching to middle of metatarsus; tibiæ usually longer than tarsi; patellæ distinct or, more rarely, scarcely developed. Clypeus incised or truncated at apex. Mandibles short and thick at the base, and with a short tooth at the apex. Body short and plump, rarely elongated. The second and third cubital cellules receive each a recurrent nervure. When there are only three cubital cellules the first is much larger than the second.

The larvæ have twenty-two legs. In form they are varied, some being longish and cylindrical like those of the *Tenthredinides*, while others are short and stumpy. Green is the predominating colour, and they are not (so far as is known) ornamented with lines or spots of different colours. A few (*Blennocampa, Hoplocampa*) bear long branched

or simple spines all over the body, while other larvæ are covered with a resinous exudation or with a white flaky substance. They either spin a simple cocoon (usually with grains of earth mixed with the silk) or simply bore into the stems of plants, and pupate there without the protection of a cocoon.

As above defined the *Selandriades* are distinguished from the *Tenthredinides* by their much smaller size, shorter spurs, and generally by the position of the basal nervure. They have never a perpendicular cross nervure in the lanceolate cellule, while in those species which have both the recurrent and transverse cubital nervure they are received close to each other, instead of being wide apart as in the *Tenthredinides.* The genera *Strongylogaster* and *Taxonus* approach very close to some of the *Tenthredinides*, but the form of the neuration and the spurs at once separate them, while the smaller species differ altogether in body form, in the petiolated or contracted lanceolate cellule and by the absence of the transverse cubital nervure in the posterior wings. It is very doubtful if the two groups can be kept apart when the extra European species have been examined and compared with those of the European fauna. *Strongylogaster*, *Taxonus* and *Pœcilosoma* are placed by André in the *Tenthredinides*, but these genera agree with the *Selandriades* in the short spurs and in the position of the basal nervure, while the first-mentioned genus, which in its typical species *S. cingulatus*, comes near to the *Tenthredinides* by its elongated body, is scarcely to be distinguished from the genus *Selandria* other than by the latter having the costa somewhat dilated before the stigma, and yet *Selandria* is placed by the French author in the *Selandriades.*

I once thought that the *Selandriades* as defined by Thomson might be split up into three or four groups, but I have abandoned this idea, because on a rigid comparison I found it impossible to get structural characters to distinguish them. For example, the genera *Phyllotoma*, *Fenusa*, *Fenella* form an apparently well-defined section, yet some of the species of *Blenno-*

campa, e.g. B. nana, can hardly be separated from *Fenusa.*

From the *Nematina* they are clearly cut off by the larvæ having twenty-two legs (although it must be said that *Hoplocampa* is a partial exception in this respect), and by the second (or first when there are only three) cubital cellule receiving only one of the recurrent nervures. Secondary points of distinction are, that the third joint of the antennæ is distinctly longer than the fourth, by the basal nervure being united to the cubital, and by the spurs being shorter. *Hoplocampa* is the connecting link between the two, it having the third and fourth joints subequal, the basal nervure received at a distance from the cubital, and by the transverse cubital and recurrent nervures in the posterior wings being joined, three characteristic features with the *Nematina.*

The *Selandriades* have a much wider geographical range than either the *Tenthredinides* or the *Nematina,* being found not only in the Nearctic and Palæarctic regions, where they are abundant, but also in the Neotropical, Ethiopian and Australian regions.

Genus—STRONGYLOGASTER.

Strongylogaster, Dbm., Consp., 4.

Wings long and narrow, with two radial and four cubital cellules; lanceolate cellule open, rarely with an oblique cross nervure. Inferior wings with the transverse cubital and recurrent nervures present, and placed at a little distance from each other. Basal nervure curved; transverse median received not far from the middle of the median cellule; accessory nervure in hind wing interstitial or nearly so.

Antennæ short, of nearly equal thickness throughout; the third joint not much longer than fourth. Head large, thick set; eyes not reaching to base of mandibles; clypeus incised. Body longish; abdomen subcylindrical, longer than head and thorax, sometimes punctured (*filicis, cingulatus*), carinated (*filicis*). Legs short; claws bifid, or with a minute apical tooth (*filicis*); tarsi shorter than tibiæ. The mandibles have a subapical tooth; the indentation between it and the apical one is rather deep. The head is large, usually with a thick swollen vertex and cheeks; the temples are margined on the lower side.

In the form of the head and in sculpture this genus approaches *Dolerus*. The species are of wide distribution in the Palæarctic region, occurring all over Europe, in Northern Siberia and Japan. Twenty species are recorded by Cresson from North America. In Central America both sections are not uncommon, twenty-five species being known from that region. Most of these are distinguished from *Strongylogaster* proper by the eyes being larger and reaching to the base of the mandibles; the head is broad and not so swollen and the clypeus is truncated at the apex. The posterior metatarsus is longer than all the other joints together, differing in this respect from the old-world species, which have the metatarsus shorter than the other joints. The Central American species have pilose antennæ; their bodies are mostly yellowish, and the wings often bear fuscous stripes at the apex, base, or middle, or all three.

Synopsis of Species.

1 (4) Lanceolate cellule with an oblique cross nervure. Pentagonal area indistinct; accessory nervure in hind wings appendiculated largely. Claws with a subapical tooth. Abdomen distinctly keeled in the middle in both sexes.
2 (3) Abdomen entirely black; tegulæ and legs yellow; abdomen impunctate. *Sharpi.*
3 (2) Abdomen banded with red; legs for the greater part black; tegulæ black in ♀, white in ♂; abdomen punctured. *Filicis.*
4 (1) Lanceolate cellule without an oblique cross nervure; claws bifid.
5 (6) Abdomen punctured; pentagonal area indistinct; hind femora and antennæ short. Body semi-opaque, covered with a close griseous pile; abdominal segments banded with yellow; stigma testaceous, black on the upper edge. *Cingulatus.*
6 (5) Body smooth, shining, almost glabrous. Pentagonal area distinct. Antennæ and hinder femora long.
7 (12) Thorax for the greater part black; abdomen banded with red; stigma black or fuscous black. Antennæ filiform; transverse median nervure received a little in front of middle of the median cellule.
8 (11) Accessory nervure in hind wings appendiculated. Femora testaceous. Middle of abdomen irregularly testaceous. Mouth white.
9 (10) Legs testaceous; hinder tibiæ at apex and tarsi fuscous. Vertex and pleuræ pubescent, scarcely shining. *Maculus.*
10 (9) Legs pale testaceous; coxæ and basal half of tibiæ pale yellow. Vertex and pleuræ shining, glabrous. *Mixtus.*

11 (8) Accessory nervure not appendiculated; femora black; third to sixth abdominal segments testaceous all round. Mouth black. *Femoralis.*

12 (7) Body for the greater part white or greenish-white, shining, glabrous. Antennæ dilated from the fifth joint; the second joint as long as the first, not transverse at the apex. Transverse median nervure received in middle of median cellule; accessory nervure in hind wings appendiculated. Stigma white. *Delicatulus.*

1. Strongylogaster Sharpi.

Strongylogaster Sharpi, Cam., E. M. M., xvi, 64 (1879); André, Species, i, 410; Cat., 51,* 10.

Black; clypeus, palpi, tegulæ, edge of pronotum, apex of the last abdominal segment above, and legs, yellowish-white. Wings hyaline; costa pale, and stigma dark fuscous. The clypeus is broadly incised, labrum fuscous, head and mesonotum slightly opaque, faintly punctured, pleuræ, sternum, and abdomen more shining and impunctate. The back of abdomen is keeled in the middle; its apex obtuse and truncated; the saw does not project. The wing cellules are broader than in the other species compared to the length; the transverse radial nervure is curved, and received before the middle of the third cubital cellule. The antennæ are shorter than the thorax and abdomen, and of the usual form. The coxæ, trochanters and knees are paler than the rest of the legs.' ♀.

Length 2¼ lines.

The smallest of the European species, being half a line shorter than *S. delicatulus.*

Taken among ferns at Crickhope Linn, Dumfriesshire, on 14th June.

2. Strongylogaster filicis.

Tenthredo filicis, Klug, Berl. Mag., viii, 216, 174; Htg., Blattw., 299, 6 ♀; Evers., Bull. Mosc., xx, 45, 7.

— *carinata*, Klug, l. c., 216, 175; Htg., l. c., 7 ♂.

Strongylogaster filicis, Thoms., Opus., 292, 1; Hym. Scand., i, 242, 1; Bold, E. M. M., x, 69; André, Species, i, 409; Cat., 51,* 9.

Black; covered with a sparse white down, abdomen reddish-brown from the second segment, the apical segment light testaceous. Legs light testaceous, femora luteous, coxæ black, hinder tarsi fuscous. Wings hyaline, costa and stigma black, the former light testaceous at the base, and the latter luteous on the lower side; nervures testaceous at base; tegulæ white. The antennæ are as long as the abdomen. ♂.

The ♀ has the tegulæ black, legs black, with the posterior tibiæ at the base, and the anterior with apex of femora testaceous; the middle of the abdomen (segments 3—6) reddish-brown.

Length 4—5 lines.

A rare species. I have only seen a ♂ taken by Mr. James Hardy at Wooler in Northumberland.

Continental distribution: Sweden, Germany, Russia.

3. STRONGYLOGASTER CINGULATUS.

Pl. XIV, fig. 7 ♂, 7*a* mandible; Pl. I, fig. 4, larva.

Hylotoma cingulata, Fab., S. E., ii, 113, 29; S. P., 27, 29.
Tenthredo cingulata, Klug, Berl. Mag., viii, 215, 173; Lep., Mon., 114, 332; Ste., Ill., vii, 81, 26; Htg., Blattw., 300, 8; Ratz., F. I., iii, 133, 43 (lar.); Evers., Bull. Mosc., xx, 45, 8.
— *linearis*, Klug, l. c., 217, 178; ♂ Htg., l. c., 300, 9.
— *xanthocera*, Ste., l. c., 81, 27 (*ab*).
— *atricornis*, l. c., 81, 28 (*ab*).
Strongylogaster cingulata, Thoms., Opus., 293, 2; Hym. Scand., i, 242, 2; Cam., Fauna, 18, 1; André, Species, i, 411; Cat., 51, 2.

Black; head and thorax coarsely punctured, the former covered with a whitish down; two basal joints of antennæ, the greater part of the legs, and a band surrounding the apex of each of the abdominal segments reddish-yellow. Tegulæ, apex of the femora and base of tibiæ (broadly) whitish-yellow; legs black at the base; the femora have usually the basal half lined with black above and beneath. Sheath black, projecting, curved and narrowed towards the apex, and very hairy on the lower side. Wings hyaline, yellowish at the apex; costa and stigma reddish-yellow; the latter is blackish at the base.

The ♂ has the antennæ quite black, and the abdomen is pale reddish, except the basal segment which is black on the upper side.

Length 4—5 lines.

A somewhat variable species in some points of its coloration. Thus, the basal joints of antennæ are almost, if not entirely, black occasionally, and sometimes the third, fourth and fifth are luteous; the amount of black on the femora varies, and the black on the abdomen is frequently pitchy.

The larva feeds on *Pteris aquilina*, and more rarely on *Polystichum filix-mas*. Its body is bright, rather deep green, paler below the spiracles, there being a white lateral line at the junction of the two colours. Legs whitish, with brown claws. Head brownish-testaceous, two oval, black, or brownish-black marks on vertex, eye spots black, mouth brownish. The skin is bare; spiracles brownish, the apical half of the last segment paler than the preceding.

They are found in June, July and August, and feed on the flat side of the leaf on the lower side. The pupa state appears to be passed in crevices in trees, holes made by beetles, &c.

As parasites there have been recorded: *Campoplex transiens*, Rtz.; *Cubocephalus fortipes*, Gr.; *Ichneumon Mussii*, Ratz.; *Mesoleius niger*, and I have also had a *Tachina* from them.

This is a very common species, and is distributed all over Britain. They are found usually on the ferns or on the flowers of *Umbelliferæ* in early summer.

The males are extremely rare in comparison to the females. I am sure I have bred and captured hundreds of the females, but have only succeeded in getting one male which I bred, and curiously enough, it appeared some days after all the females in the same batch had emerged. Mr. F. Smith told me that this is also his experience. He has sometimes had forty or fifty females in his net at a time, without one male among them. In all, Mr. Smith has taken only five or six males, and I believe that this is pretty much the experience of most collectors. We may then, I think, conclude that parthenogenesis plays a constant *rôle* with this species; a view confirmed by my having got two virgin females to deposit fertile eggs, but the larvæ unfortunately died young, so that I do not know whether males or females would be produced.

Continental distribution: Sweden, Germany, Holland, France, Switzerland, Tyrol, Russia, Spain, Portugal.

Obs.—The North American *S. multicinctus*, Norton, appears to be very closely allied to, if not a variety of, *cingulatus*.

4. STRONGYLOGASTER MACULUS.

Tenthredo macula, Klug, Berl. Mag., viii, 217, 177; Htg., Blattw., 301, 11.
Strongylogaster macula, Thoms., Op., 393, 3; Hym., Scand., i, 243, 4; André, Species, i, 413; Cat., 51,* 7.

Black, scarcely shining; covered with a short pubescence on head and thorax; clypeus and labrum, tegulæ and a broad line on prothorax dull yellowish-white. Abdomen irregularly banded in the middle with dull red. Legs testaceous; apex of tibiæ and tarsi fuscous. Wings hyaline; costa and stigma black, the former fuscous at the base; transverse radial nervure received not far from the third transverse cubital; third cubital cellule shorter than the second. Accessory nervure in hind wing not appendiculated.

♂ has the antennæ as long as the body; posterior femora almost entirely black.

Length 3½ lines.

In form and general coloration *maculus* agrees with *mixtus*, but the colour on thorax and mouth is more dingy, the legs want the yellow so conspicuous in *mixtus*; the head and thorax are not so shining and more pubescent, this being especially noticeable on the pleuræ, the head broader and the antennæ longer.

Rare. Clydesdale on ferns.

Continental distribution: Sweden, Germany, Tyrol.

5. STRONGYLOGASTER MIXTUS.

Pl. I, fig. 6 and 6 *a*, Larva?

Tenthredo mixtus, Klug, Berl. Mag., viii, 217, 176; Hartig., Blattw., 301, 10.
Srongylogaster mixtus, Cam., Fauna, 18, 2; André, Species, i, 412; Cat., 51,* 3; Thoms., Hym. Scand., i, 244, 5.

Black, smooth, shining, almost glabrous; labrum, clypeus, tegulæ, a broad band on the prothorax clear white; middle three or four abdominal segments irregularly marked with red above, the sides testaceous; apical segments above and all the segments beneath marked with white at the apex. Legs pale red; apex of coxæ, trochanters, femora and basal half of tibiæ yellowish-white; tarsi fuscous at the apices of the joints. Wings hyaline; costa at base pale; the rest and stigma black; transverse radial nervure interstitial or nearly so; accessory nervure in hind wing appendiculated.

The ♂ has the antennæ shorter than the body; the base of the anterior femora and the posterior almost wholly black (*teste* C. G. Thomson).

Length 3¼—3¾ lines.

Not very common in Clydesdale during May and June. What I take to be its larva is figured on Pl. I, fig. 6. It is very like that of *delicatulus*, but scarcely so hairy, and the head is entirely green.

Continental distribution: Sweden, Germany.

6. STRONGYLOGASTER FEMORALIS.

Pl. XI, fig. 2, ♀.

Strongylogaster femoralis, Cam., E. M. M., xi, 250; Fauna, 18, 3; André, Species, i, 413; Cat., 51,* 4.

Antennæ filiform, black, shorter than the thorax and abdomen. Head shining, smooth, black. Thorax black, shining, glabrous; pronotum broadly edged with sordid white; tegulæ white; cenchri small, obscure white. Abdomen black, less shining than the thorax; four middle segments red above and beneath, but faintly edged with black at the sides; the apex acuminate; cerci moderately long. Wings hyaline; nervures, costa and stigma black; the transverse radial nervure is received some distance in front of the third transverse cubital one; accessory nervure in hind wing not appendiculated. Legs sordid testaceous; the femora black, except at the apices and at the base of the posterior pair; the knees have a yellowish hue; hinder tibiæ darker than the four anterior; posterior tarsi fuscous.

The ♂ has the antennæ as long as the body; the anterior femora at the base and the posterior almost wholly fuscous-black.

Length 3¾ lines.

Femoralis is most nearly related to *maculus*, but differs in its narrower, more cylindrical body, the head and thorax more shining, less pubescent, in the abdomen being distinctly banded with red, and in the black coxæ, femora and mouth; the third joint of antennæ appears to be shorter and thicker in proportion to the fourth. It also differs from *maculus* (and also *mixtus*) in the basal cellule being shorter, and in the transverse median nervure being received not far from the middle of the cellule, while in the other two species it is received much nearer the apex. The third cubital cellule, too, is distinctly longer than the second; in *maculus* and *mixtus* they are almost equal.

7. STRONGYLOGASTER DELICATULUS.

Pl. XI, fig. 3 ♀ ; Pl. I, fig. 7, larva.

Tenthredo delicatulus, Fall., Acta, 1808.
— *eborina*, Klug, Berl. Mag., viii, 196, 141; Htg., Blattw., 301, 12.
Strongylogaster delicatula, Thoms., Op., 293, 4; Hym., i, 244, 6; Cam., Fauna, 18, 4; André, Species, i, 412; Cat. 51,* 5.
Selandria phthisica, Voll., Tidj. Ent., (2), iv, 123, pl. 3, fig. 4.
Strongylogaster viridis, Smiedeknecht, Ent. Nacht., 1881; André, Species, i, 412; Cat., 51,* 6.

White (greenish when fresh), smooth, shining, glabrous; head (mouth excepted), a small mark in front of mesonotum, one on each side of it, some marks on metanotum, and a large spot on breast, black. Antennæ fuscous above from the second segment; abdomen with fuscous marks along the sides, which are narrow at the base and become united in the middle at the apex, where the colour is also darker. Wings hyaline; costa and stigma white.

The intensity of the black markings on the abdomen varies, some having only a very faint fuscous line along the sides. The ♂ has usually only a thin fuscous line down the sides of the abdomen and a large mark in the centre of the three last segments.

Length 2¾—3 lines.

The larva is found in July and August feeding on the male and female ferns. It is entirely green like the colour of the ferns. The body is covered with tubercles from each of which projects a longish, bristle-like hair. On the pale greenish head are two black marks on the posterior edge of the vertex.

I do not know in what manner it pupates in a state of nature, but in my breeding pots it bored into corks where it passed the winter, without having spun a cocoon.

Delicatulus is an abundant Scotch and North of England species, but appears to be rare farther south, if it is not absent there entirely.

On the Continent it is common in Sweden, rare in Germany, Holland and France, which are the only countries from which it has been recorded.

Genus—SELANDRIA.

Selandria, Leach, Zool., M., iii, 126.

Wings with two radial and four cubital cellules. Lanceolate cellule open. Posterior wings with the transverse cubital and recurrent nervures present, and placed not far from each other. Post-costal nervure thickened and almost joined to costal in front of stigma. Antennæ shorter than abdomen, thickish, the third joint much longer than fourth. Eyes generally reaching to base of mandibles. Clypeus slightly incised. Patellæ distinct. Body short, ovate, shining. For Trophi, see Pl. XIII, fig. 9.

The basal nerve is curved; the 1st tr. cubital nervure is sometimes absent. The colour is either black throughout, with yellow, or black and white legs, or the abdomen is luteous, with the legs and part of thorax of the same colour. They are sluggish, heavy flying insects.

The larvæ are of the usual shape, but thicker compared to the length than those of *Taxonus* or *Strongylogaster*. So far as is known at present they feed either on grasses or ferns.

Selandria comes nearest to *Strongylogaster* in neuration, but differs in the shorter, more thick-set body, shorter and thicker antennæ, and in the thickened subcostal nervure. The wings, too, are broader, and the hinder tarsi shorter compared to the tibiæ. *Eriocampa* is easily separated from it by the lanceolate cellule having an oblique cross nervure.

The species are confined to the European subregion, the Neartic region and Central America; there are ten species known from America, and twelve from Europe.

Synopsis of Species.

1 (6) Abdomen luteous.
2 (5) Eyes nearly touching the base of the mandibles; labrum and base of antennæ black.
3 (4) Third antennal joint not much more than double the length of fourth. Second transverse cubital nervure not interstitial. *Serva.*

4 (3) Third antennal joint more than double the length of fourth; second transverse cubital nervure interstitial. *Sixii.*
5 (2) Eyes distinctly distant from base of mandibles; labrum and base of antennæ luteous. *Flavescens.*
6 (1) Abdomen black.
7 (12) Tegulæ white.
8 (9) Anal segment bordered with white; coxæ for the greater part white. *Analis.*
9 (8) Anal segment and coxæ black.
10 (11) Pentagonal area distinct; temples margined behind. *Stramineipes.*
11 (10) Pentagonal area indistinct; temples not margined. *Temporalis.*
12 (7) Tegulæ black.
13 (14) Legs yellowish. *Morio.*
14 (13) Legs black and white. *Aperta.*

1. SELANDRIA SERVA.

Pl. XXI, fig. 1, *Saw.*; Pl. XII, fig. 11, Mandible.

Tenthredo serva, Fab., E. S., ii, 119, 21; Klug, Berl. Mag., viii, 47, 7; Lep., Mon., 114, 334; Htg., Blattw., 282, 53.
— *socia*, Klug, Ill., vii, l.c., 10; Htg., Blattw., 282, 55.
Hylotoma serva, Fab., S. P., 26, 22.
Selandria serva, Ste., Ill., vii, 45, 1; Evers., Bull. Mosc., xx, 33, 17; Thoms., Op., 291, 1; Hym., Sc., i, 236, 1; Cam., Fauna, 23, 1; E. M. M., xlii, 198; André, Species, i, 294; Cat., 36*, 1.
— *socia*, Ste., 80, 24.
— *dorsalis*, Ste., Ill., vii, 45, 2.

Yellow; head, breast, meso- and metanotum black, shining, covered with a longish black pile. Wings (including nervures) more or less yellowish at the base; second recurrent nervure received a good piece past the second transverse cubital; apical nervures black; basal three fourths of costa yellow, the remainder with stigma black, the latter yellowish beneath. The mouth is occasionally pale.

The ♂ has the mouth pale; the apex of abdomen and of the legs black, and the thorax is entirely black.

Ab.—a. ♂. Pronotum with a yellow line.
„ *—b.* ♀. Mouth and basal joint of antennæ pale yellow.
Length 3—3½ lines.

The ♂ is more variable than the ♀. It varies especially in the amount of black on the abdomen and in the colour of the wings; in some specimens they are almost hyaline, while in others they are decidedly blackish.

This is a very common species in marshy places in June and July. It appears to be common everywhere.

2. SELANDRIA SIXII.

Pl. XXI, fig. 2, Saw.; Pl. XII, fig. 1, ♀ ; Pl. II, fig. 9, Larva.

Selandria sixii, Voll., Bouwstoffen, iii, 278 (1858); Tidj. Ent., xxii, 18, pl. 4, (lar., &c.); André, Species, i, 295; Cat., 36,* 2.
„ *grandis*, Zad., Beschr., 36; Cam., E. M. M., xiii, 198; Fauna, 23, 2.
„ *interstitialis*, Thoms., Hym. Sc., i, 237, 2.
„ *serva*, Stein, Ent. Nacht., vi, p. 251 (lar.).

Similar to *S. serva*, but much larger, the joints of the antennæ more distinctly separated, distinctly projecting at the apices; the third nearly three times longer than the fourth, the second recurrent nervure interstitial and the saw differs slightly.

Length 3½—4 lines.

The labrum is either black (as is generally the case) or pale yellow, the thorax is entirely black (with the exception of the limb of the pronotum, which is yellow), or the mesonotum, metanotum, and breast only are black; the blotch on each side is surrounded with black, or it may be without any black; and occasionally specimens are got with a row of black dots on the back of the abdomen in the centre.

The ♂ is similar to that of *Serva* and is subject to the same colour variation; it may, however, be always known from the ♂ of *Serva* by the apex of the abdomen being broadly rounded, while in *Serva* it is considerably narrowed at the point. The third joint appears to be shorter in proportion to the fourth than in the ♀.

The larva feeds on *Poa aquatica* during the summer, and spins up at the middle of July in a brownish cocoon in the earth. Its head is clear brown, darker on the vertex and between the eyes. The body is clear green, with a darker line down the back, the belly whitish, and the spiracles brown. From the summer brood there issues a second generation in the beginning of August (cf. Vollenhoven, l. c.).

The larva described by Stein under the name of *Serva* (l. c.) as feeding on *Carex acuta*, *Juncus effusus*, &c., *Scirpus palustris*, &c., if really that of *Serva*, agrees very closely with that of *Sixii* in every respect, and has the same habits. *Euryproctus geniculosus*, Gr., is recorded as a parasite.

A common Scotch insect, but not nearly so abundant as *Serva*.

Continental distribution: Sweden, Germany, Holland, France.

3. SELANDRIA FLAVENS.

Tenthredo flavens, Klug, Berl. Mag., viii, 47, 8; Htg., Blattw., 284, 54; Evers., Bull. Mosc., xx, 33, 18.
— *puella*, Fall., Mon.
Selandria flavescens, Thoms., Opus., 291, 2; Hym. Sc., i, 237, 3 Cam., E. M. M., xiii, 198; Fauna, 24, 3; André, Species, i, 293; Cat., 36,* 3.

Black, shining, almost glabrous; mouth, tegulæ, pronotum, abdomen, antennæ at base and legs yellow, except the coxæ, which are black. Wings yellowish-hyaline, apical half of costa and stigma black; nervures yellowish at base, black at the apex. The joints of antennæ distinctly separated.

Length 3 lines.

Ab.—*a.* Base of antennæ and mouth black.
,, —*b.* Pronotum black.

The femora are sometimes lined with black, the base of abdomen is often blackish or fuscous, and the stigma dilute fuscous.

Easily known from the preceding species by the form and position of the eyes and by the less pilose body.

The ♂ in the form of the body resembles *Serva*; the legs are black at the base.

Not a common species. I have taken it rarely in marshy places in Clydesdale.

Continental distribution: Sweden, Germany, France, Russia.

4. SELANDRIA STRAMINEIPES.

Tenthredo stramineipes, Klug, Berl. Mag., viii, 75, 61; Htg., Blattw., 282, 56; Evers., Bull. Mosc., xx, 33, 19.
— *albipes*, Lep., Mon., 105, 299.
Selandria stramineipes, Ste., Ill., vii, 49, 20; Thoms., Op., 291, 3; Hym. Sc., i, 238, 4; Cam., E. M. M., xiii, 198; Fauna, 24, 4; André, Species, i, 295; Cat., 37,* 9.

Short, stout, black, shining; labrum, tegulæ and legs whitish-yellow. Wings subhyaline; nervures, costa and stigma black. Head and thorax covered with a thick pubescence. Coxæ black.

The ♂ has a yellowish line in front of the tegulæ, and the coxæ and trochanters are black.

Length 2½—3 lines.

? *Ab.—a.* Coxæ yellowish, the extreme base only black.
,, *—b.* Labrum black.

A not uncommon species in May and June on ferns. The *ab. b.* is the common form in Scotland.

Continental distribution: Sweden, Germany, Tyrol, France, Russia.

5. SELANDRIA ANALIS.

Selandria analis, Thoms., Hym. Sc., i, 239, 6; André, Species, i, 295; Cat., 36,* 6.
— *cereipes*, Voll., Tidj. Ent., viii (2), 13—15, pl. 3, fig. 6 (lar., &c.).

Black, shining; head and thorax covered with a fuscous pubescence; labrum, palpi, tegulæ, a thin line at base of pronotum, legs (save the base of coxæ) and the anal segment above, white. Wings scarcely hyaline; accessory nervure in hind wings interstitial. Costa and stigma black, the former testaceous at base. Pentagonal area distinct; eyes large, oval, not reaching to base of mandibles; cheeks margined; head not projecting behind the eyes.

♀. Length 2½ lines.

The antennæ are longer and thinner than in either of the two succeeding species, the legs not so stout, calcaria shorter and the hinder tarsi longer compared to the tibiæ; while the head does not project behind the eyes, but is rather narrowed. The legs, too, want the yellowish tinge so noticeable in *Stramineipes*.

The larva is stated by van Vollenhoven to feed on *Polystichum felix-mas* during August, resting with the body stretched out on the upper side of the leaflets. It is 22‴ long, head smaller than second segment, brown, with black eye spots; the upper part of the body to near the spiracles is leaf-green like the colour of the leaf; below that it is paler; the spiracles brownish. Legs glassy white with brown claws. A cocoon is spun in the earth of the usual form.

Rare, seemingly, in this country—Glanville's Wootton.

Continental distribution: Sweden, Holland.

6. SELANDRIA TEMPORALIS.

Selandria temporalis, Thoms., Op., 292, 6; Hym. Sc., i, 240, 9; André, Species, i, 296; Cat., 37,* 7.

Black, smooth, shining, covered on head and thorax with a fuscous pubescence; labrum, tegulæ, legs (save coxæ which are black, and apex of tarsi which is fuscous), yellowish-white. Wings subhyaline; costa and stigma black, the former testaceous at the base. Pentagonal area indistinct. Temples not margined. ♀

Length 2 lines.

A smaller species than *Stramineipes*, with the antennæ shorter, the palpi and apex of tarsi fuscous, and easily known otherwise by the form of the temples and the indistinct pentagonal area.

A rare species. Taken by myself near Dumfries in June.

Continental distribution: Sweden.

7. SELANDRIA MORIO.

Pl. XIII, fig. 3, ♀.

Tenthredo moria, Fab., S. E., ii, 119, 55; S. P., 36, 31; Pz., F. G., lxix, fig. 17; Fall., Acta Holm., 1807, 208, 19; Klug, Berl. Mag., viii, 60; Htg., Blattw., 282, 57.

Selandria morio, Ste., Ill., vii, 50, 23; Thoms., Op., 291, 4; Hym. Sc., i, 239, 7; Tasch., Ent. f.-Gärt., 155; Kalt., Pfl., 261; Cam., E. M. M., xvii, 198; Fauna, 24, 5; André, Species, i, 296; Cat., 37* 9.

Black, shining, slightly pilose on the head and thorax. Antennæ covered with a microscopic pile. Legs yellow, black at the base, posterior tarsi fuscous. Wings smoky; costa and tegulæ black. The first transverse cubital nervure very faint; accessory nervure in hind wings received in front of the transverse median. The pentagonal area indistinct. ♀ and ♂.

Length 2½ lines.

Common and generally distributed.

Continental distribution: Sweden, Germany, Holland, France.

Obs.—I have always taken this species on birch and generally where no *Ribes* was near. Nevertheless it has been stated by Bechstein to feed on *Ribes rubrum*, the larva being further stated to be twenty-footed, to have a green body covered with black tubercles and a black head, and they are said to feed in companies in May and at the commencement of June, appearing in the perfect state at the end of July (cf. Kalt., l.c.). Kaltenbach, who quotes these observations, says that he himself always captures the insect on low-growing willows.

8. SELANDRIA APERTA.

Pl. XIII, fig. 9 ♀.

Selandria aperta, Htg., Blattw., 282, 58; Thoms., Op., 291, 5; Hym. Sc., i, 240, 8; Evers., Bull. Mosc., xx, 33, 20; Cam., E. M. M., xiii, 198; André, Species, i, 297; Cat., 37,* 10.

Black, shining, covered with a fuscous-black pubescence. Knees and tibiæ white; the apical half of posterior tibiæ black; the four anterior tibiæ at the apex and tarsi fuscous. Wings slightly infuscated; the third cubital cellule is short, much wider at apex than base; the accessory nervure in hind wing is received in front of the transverse median.

Length nearly 3¼ lines.

Seemingly not a common species. The only specimens I have seen were taken by Mr. R. McLachlan in the London district, and by Mr. Fletcher at Worcester.

It has a wide distribution over the Continent, being found in Sweden, Germany, Holland, France and Russia.

The imago appears, according to Hartig, on *Sorbus aucuparia*.

Genus—TAXONUS.

Taxonus, Htg., Blattw., 297.
Ermelia, Costa, Fauna di Napoli, 1860.

Wings with two radial and four sucubital cellules, the two former equal in length, or the second longer than the first; the third cubital usually shorter than second, and dilated at apex. Transverse radial nervure received near the third transverse cubital or united with it. The second and third cubital receive each a recurrent nervure; the second is parallel with the basal. Lanceolate cellule with an oblique cross nervure. Transverse median nervure usually received not far from the middle of the median cellule. Posterior wings with the transverse cubital and recurrent nervures absent, but present in one species (*agrorum*) in the ♀, while in the ♂ they (with the transverse median) form a border round the edge of the wing. The accessory nervure is scarcely appendiculate with some species and not at all with others. Antennæ short; the third joint a little longer than fourth. Abdomen depressed. Head subcubital, margined on top. Clypeus excised. Legs longish; tarsi as long as tibiæ; claws armed with a minute tooth; patellæ small.

Generally the body is smooth and shining, rarely punctured on vertex and scutellum. The body is either entirely black or black with the abdomen banded with red; the legs are usually red, but are black with one species.

The genus perhaps has the greatest resemblance to *Emphytus*, which it is not unlike in the form of the head, antennæ and abdomen, but differs in having four cubital cellules. *T. agrorum* has the neuration of the first section of *Strongylogaster*, but the form of the head and abdomen is different, the cross nervure in lanceolate cellule is much more oblique, and the accessory nervure in hind wing is not appendiculated.

The species are generally distributed over the European continent, but are rare outside of it, although one species is found in Brazil. They appear in the spring and early summer, and with the second brood in Autumn. As for the larvæ they are cylindrical, usually green, paler at the sides. They feed on herbaceous plants (*Polygonum*, *Rumex*) and pass the pupa state in stems. Nine European species are known, six from North America and one from Brazil.

Synopsis of Species.

1 (2) Posterior wing with two middle cellules; in the ♂ the cubital and transverse nervures are at the edge of the wing; third cubital cellule as long as the second; clypeus broadly excised, with the edge sharp; labrum large, narrowed at the point. Posterior tibiæ slightly curved; scutellum and pleuræ coarsely punctured. *Agrorum.*
2 (1) Posterior wings with no middle cellules in both sexes; third cubital cellule shorter than the second, dilated at the apex; clypeus roundly margined, the edge not sharply pointed; labrum small; posterior tibiæ straight; scutellum and pleuræ smooth.
3 (8) Legs reddish.
4 (5) Abdomen with a red band; tegulæ white. *Equiseti.*
5 (4) Abdomen without a red band.
6 (7) Tegulæ and pronotum black, body with a bronzy tinge. *Glabratus.*
7 (6) Tegulæ and edge of pronotum white; body without a bronzy tinge. *Fletcheri.*
8 (3) Legs black. *Glottianus.*

1. TAXONUS AGRORUM.

Plate XI, fig. 6, ♂, 6*a*, Posterior wing.

***Tenthredo agrorum*, Fall., Acta, 1808, 59, 18.**
— *nitida*, Klug, Berl. Mag., viii, 218, 179; Htg., Blattw; 298, 1.
— *anomala*, Evers., Bull. Mosc., xx, 43, 1.
***Allantus nitida*, Ste., Ill., vii, 71, 44.**
***Taxonus* — Tasch., Hym. Deut., 17.**
— *agrorum*, Thoms., Opus., 290, 1; Hym., Sc., i, 234, 1; Cam., Fauna, 19, 1; André, Species, i, 336; Cat., 42,* 3.

Black, smooth, shining, covered with a close grey pubescence; scutellum and pleuræ coarsely punctured; breast smooth, shining; three middle segments of the abdomen and legs reddish; anterior coxæ, base of femora, four anterior tibiæ and tarsi behind, the apical knees, apex

of tibiæ and tarsi (except the extreme base of the joints) black; four anterior tibiæ and tarsi pale in front, posterior trochanters white. Wings hyaline, stigma and nervures black; tegulæ black.

Length 4½ lines.

This species differs from all the other forms in the hind wings having two middle cellules, while in the ♂ the nervures are at the edge of the wings. They also diverge from them in the punctured scutellum and pleuræ, the lower part of the pronotum, too, being ridged and projecting. It is also the largest species in the genus.

The ♂ has the abdomen bluntly ridged, and the red band is smaller (as a rule) and more irregular at the edges. In both sexes the black on the legs varies in extent.

Agrorum does not appear to be a common species. Stephens (if his specimens were correctly identified) records it from Birch Wood and Devonshire. I have myself taken it on the Carron, not far from the Dornoch Frith.

It appears to be not uncommon on the Continent, being found in Sweden, Germany, Holland, France and Russia.

2. TAXONUS EQUISETI.

Plate XI, fig. 7, Scotch variety of ♀.

Tenthredo equiseti, Fall., Acta, 1808, 60, 20.
— *bicolor*, Klug, Berl. Mag., 219, 181; Htg., Blattw. 298, 3; Evers., Bull. Mosc., xx, 43, 2.
— *coxalis* (Klug), Htg., Blattw., 298, 4; Evers., l. c., 44, 3.
— *sticticus*, Klug, Berl. Mag., viii, 218, 180; Htg., Blattw., 298, 2.
— *bizonata*, Zett., Ins. Lapp., 344, 24.
Allantus bicolor, Ste., Ill., vii, 71, 43.
Taxonus bicolor, Tasch., Hym. Deut., 17.
— *pratorum*, Thoms., Opus., 290, 2.
— *equiseti*, Thoms., Hym. Sc., i, 234, 2; Cam., E. M. M., xi, 129, var., E. M. M., xiii, 196 (lar.), Fauna, 19, 2; André, Species i, 337, pl. xx, fig. 3 (im.); Cat., 42,* 6.
— *sticticus*, André, l. c., 337; Cat., 42,* 5.

Black, shining, covered with a fuscous pubescence; labrum, tegulæ and palpi white. Legs and two or three of the abdominal segments red; coxæ, trochanters, extreme base of femora, black; apex of anterior tarsi and the whole of the posterior black. Wings hyaline, costa and stigma black. ♀ and ♂.

Length 3¼—3¾ lines.

The position of the tr. radial nervure is subject to irregularity. It is often received near the middle of the third cubital cellule, and as often in the fourth cubital.

The following aberrations occur:

a. Abdomen with four segments red, and the stigma pale at the base (the other forms have the latter peculiarity to some extent). *Sticticus*, Kl.

b. Abdomen with three segments red. *Bicolor*, Kl.

c. Abdomen with two segments red. *Coxalis*, Kl.

d. Abdomen with two segments and a triangular blotch in the segment succeeding these, red. (Scotch variety.)

The larva of this species feeds in the summer and autumn on *Rumex acetosella*, in the leaves of which it eats irregular, generally somewhat squarish, holes; and, as the larvæ usually are found together, the plants infested by them get their leaves nearly all destroyed.

The upper part of the head of the larva is fuscous, the lower portion white and the mouth brown; the eyes are situated at the end of the fuscous part. Legs white. The lower part of the body is whitish, with the spiracles brownish; upper half green, sometimes tinged with red on the back, probably through the food shining through. The skin is in furrows, obscurely marked with black.

When the larva becomes full fed the body gets shorter and assumes a yellowish tinge. I presume that in a state of nature they spin no cocoon, but like those of *glabratus* burrow in stems, since in my breeding jars they bored into corks and bramble stems provided for that purpose. Apparently there is only one brood in the year. The perfect insect makes its appearance in June in Scotland.

Kaltenbach (Pfl. 519) describes a larva on *Rumex* which is probably that of *Equiseti.*

A common and widely-distributed species in Britain, being found from Sutherlandshire to the London district.

On the Continent it is found in Sweden, Germany, Holland, France and Russia.

3. TAXONUS GLABRATUS.

Plate II, fig. 3, Larva ; Pl. XX, fig. 6, Saw.

Tenthredo glabratus, Fall., Acta, 1808, 108, 43.
— *agilis*, Klug, Berl. Mag., viii, 208, 159 ; Htg., Blattw., 298, 5 ; Evers., Bull. Mosc., xx, 44, 4.
— *rufipes*, Lep., Mon., 81, 239.
Allantus agilis, Ste., Ill., vii, 72, 45.
— *rufipes*, Ste., Ill., vii, 72, 46.
Taxonus agilis, Tasch., Hym. Deut., 17 (lar.).
— *glabratus*, Thoms., Opus., 290, 3 ; Hym. Scand., i, 235, 3 ; Cam., xi, 108 (ec.), Fauna, 19, 3 ; André, i, 337 ; Cat., 43,* 8.

Violet, coppery black, smooth, shining ; legs reddish, base of coxæ and posterior tarsi fuscous or fuscous black ; wings hyaline ; stigma and nervures black. ♀ and ♂.

Length 3—3¾ lines.

Distinguished from all the species by its coppery violet colour, unicolorous abdomen and black tegulæ.

The larva feeds on *Polygonum bistorta.* Its usual habit is to remain on the underside of the leaf, curled up in a ring, with the anal segment slightly elevated. In this position it eats either circular holes in the centre of the leaf, or feeds along the edge. There are two broods in the year : the first in June and July, the second from August to October, and this last generation seems to be the larger of the two.

The larva has the upper part of the head brownish-black, this dark portion being divided in the middle by a paler stripe (absent in some specimens), and others have the vertex very pale fuscous, the colour of the vertex being subject to considerable variation. Face whitish-green, with a somewhat semicircular fuscous or pale brown mark in the centre ; mouth deep brown, mandibles darker; the black eyes are placed in the pale-coloured part of the head. Legs glassy white, with pale brown claws. The upper part of the body to the spiracles is dark drab-green, which has a lighter tint when the food canal is filled; the lower part is white; the skin is closely wrinkled. When full fed the colour of the body has a yellowish tinge.

The pupa is glassy green, with the limbs white.

The larvæ bore into the stems of brambles and other plants with pithy stems in order to pass the pupal state.

A very common and universally distributed species.

Its European distribution is the same as that of *Equiseti*.

As already remarked (*antea*, p. 30), I succeeded in getting virgin females of *T. glabratus* to lay eggs, and I am now able to add (June, 1882) that three males were reared from these unfertilized eggs.

4. TAXONUS FLETCHERI.

Taxonus Fletcheri, Cameron, E. M. M., xiv, 266 (1878).

Black, shining, covered with a scattered pubescence; labrum, edge of pronotum and tegulæ white; legs reddish, pale at the base, and at the anterior tibiæ in front; apex of the tibiæ and tarsi black. Wings almost hyaline; costa and stigma black; the transverse radial nervure is almost interstitial. ♂.

Length 2 lines.

An easily recognised species. It is three-quarters of a line shorter than the smallest male I have seen of *T. glabratus*, and its body wants the coppery hue of the last-mentioned species, while it has also the tegulæ and edge of the pronotum white.

The *T. albipes* of Thomson comes near to *Fletcheri*, but it has the pronotum black, the body almost glabrous, legs yellowish-white, the four anterior tarsi and apices of tibiæ are not black, while *Albipes* is likewise larger than our insect.

The only specimen known was taken by Mr. J. E. Fletcher, of Worcester, near that place on 30th July on alder.

5. TAXONUS GLOTTIANUS.

Taxonus glottianus, Cameron, E. M. M., x, 220; Cam.. Fauna, 19, 4; André, Species i, 335; Cat., 42,* 2.

Black, half shining, very slightly pubescent on the head and thorax; knees, anterior tibiæ and base of tarsi sordid testaceous. Wings almost smoky; costa and stigma black, the latter pale testaceous at the base; in the second cubital cellule is a small horny point.

Length 3, alar exp. 6 lines.

The black legs readily separate this insect from the other species of the genus. Apart from the generic characters it might almost pass for *Emphytus tener*.

Apparently a very rare species. I have only succeeded in taking one female, which was got on 26th May at Kenmuir Bank on the Clyde above Glasgow.

Genus—PŒCILOSOMA.

Pœcilostoma, Dbm., Consp., 5.
Empyria, Brullé Hymen, iv, 666.

Wings with two radial and four (sometimes only three) cubital cellules. Lanceolate cellule with an oblique cross nervure. Transverse median nervure received in middle of median cellule. Hind wings with the recurrent nervure present, the transverse cubital absent, accessory nervure shortly appendiculated. Antennæ short, rarely longer than abdomen, thin, attenuated at apex, rarely thick, with the joints truncated at the apex. Abdomen oblong, widening out from the third segment; blotch distinct. Eyes not reaching to base of abdomen. Clypeus incised. Legs longish, patellæ distinct; claws bifid, or with a minute tooth at the apex.

The ground colour of the abdomen is usually black, rarely luteous. When not entirely luteous the segments are lined with white or luteous, and the apical segments may be entirely luteous. The legs with one group are luteous, with another black, marked with white at the knees. The stigma is luteous or black, as the legs are black or luteous. With the black species the dorsal abdominal segments bear white markings.

The alar neuration is subject to considerable variation. With the black-legged species the first transverse cubital nervure is usually absent, either constantly in particular species, or occasionally with certain species. In the same way the hind wings may want the recurrent nervure, and when this is combined with the absence of the first transverse cubital nervure in the front wings, we get the neuration of *Emphytus*. The relative size of the third cubital cellule varies in the different species, as does also the position of the recurrent nervures.

The larvæ are similar to those of *Taxonus*, and have the same habits. Nine European species are known and two North American.

Synopsis of Species.

1 (2) Abdomen luteous. Antennæ short, thick, the joints sharply cut off from each other and slightly produced at the apices beneath. Wings with four cubital cellules, hind wings with the recurrent nervure present. Head distinctly inflated behind the eyes. Clypeus deeply incised. Antennal fovea large (=*Monostegia*, Costa). *Luteolum.*

2 (1) Abdomen black.

3 (8) Legs for the greater part white or luteous, the abdominal segments broadly bordered with white.

4 (5) Hind wings with the recurrent nervure absent. Antennæ not much longer than double the length of the head, third joint not much longer than fourth. Face and orbits of eyes white. Clypeus broadly, but not deeply emarginated. Claws with a minute subapical tooth. *Candidatum.*

5 (4) Hind wings with the recurrent nervure present. Antennæ distinctly longer than head and thorax.

6 (7) Legs entirely luteous, first transverse cubital nervure present. Antennæ short, the third joint much longer than fourth; third cubital cellule long and narrow. *Pulveratum.*

7 (6) Femora lined with black, first transverse cubital nervure absent. Antennæ longish, attenuated at the apex; third (second) cubital cellule short and broad. *Fletcheri.*

8 (3) Abdomen and legs black; pronotum with a white line; abdomen often bearing white lateral spots. Recurrent nervure in hind wings present; first cubital nervure often absent (=*guttatum*, Fall, and *impressum*, Kl.).

9 (16) Pronotum lined with white.

10 (11) Hinder calcaria a third of the length of metatarsus, antennæ thickish, wings infuscated, claws bifid. *Guttatum.*

11 (10) Hinder calcaria not a third of the length of metatarsus; antennæ attenuated at the apex; wings subhyaline.

12 (15) Posterior tibiæ and tarsi not broadly white at base; costa and stigma black, clypeus truncated at apex.

13 (14) Claws almost bifid, antennæ longish, in ♂ longer than the body. *Longicorne.*
14 (13) Claws with a subapical tooth. Antennæ short; in ♂ not much longer than abdomen. *Submuticum.*
15 (12) Tibiæ and tarsi broadly white, costa and stigma dull testaceous; clypeus deeply incised. *Excisum.*
16 (9) Pronotum entirely black, antennæ short, thick. *Nigricolle.*

1. PŒCILOSOMA LUTEOLUM.

Pl. IV, fig. 12, Larva.

Tenthredo luteola, Klug, Berl. Mag., viii, 9; Htg., Blattw., 281, 52 (*Eriocampa*).
Menostegia luteola, Costa, F. N., 1861.
Selandria luteola, Kalt., Pfl., 423, 426.
Pœcilosoma luteola, Thoms., Op., 288, 2; Hym. Sc., i, 228.
Eriocampa luteola, André, Species, i, 319; Cat., 10,* 2.

Antennæ shorter than the head and thorax, thickish, a little dilated at the apex; first joint a fourth longer and thicker than the second; third a quarter longer than the fourth; remaining joints becoming gradually shorter; black, pale luteous beneath, and covered with a short pile. Head black, half shining, densely covered with a short pile; frontal sutures invisible; apex of clypeus and labrum luteous. Thorax black, pilose; breast and pleuræ very smooth and shining, slightly pilose. Tegulæ and pronotum luteous; cenchri large, pale white. Sutures of mesonotum moderately deep. Abdomen luteous, a very little narrower than the thorax, of nearly uniform breadth, blunt at the apex; blotch large, pale white; sheath black, projecting. Legs luteous, the apices of the tarsi fuscous. Wings longish, with a smoky tinge, yellowish at the base, more hyaline at the apex; costa luteous at the base, the apex with the stigma fuscous; nervures yellowish at the base, blackish at the apex; the first radial cellule smaller than the second, tr. radial nervure curved, received a little beyond the middle of the third cubital cellule; first cubital cellule a little shorter than the second, a half wider at the base than at the apex; second narrow, of nearly equal width throughout, except where the recurrent nervure is received; third a fourth longer, more than double the width of its base at the apex; fourth a little longer than the first two; the second recurrent nervure is curved, and is received a little in front of the middle of the cellule.

Length 3½ lines.

The ♂ is unknown to me, and appears to be very rare.

Luteolum differs from all the other species of *Pœcilosoma* in the colour of the abdomen. It resembles very much the yellow species of *Selandria* in many respects, but is best, I think (unless it be placed in a genus by itself as has been done by Costa), regarded as a *Pœcilosoma*, although it differs considerably from the other species of that genus, not only in coloration, but also in form. From *Selandria* it differs in the structure of the antennæ, of the lanceolate cellule, and in the neuration of the hind wings.

The larva feeds on *Lysimachia vulgaris*, and, according to Kaltenbach, on *Anagallis arvensis*, during August and September. It is cylindrical, glabrous, save a very short white down on the head. The head is pale yellow, with a large black mark on the vertex, narrow before and behind, and extending from the back of the head till it reaches the level of the eyes, which are black. Mouth piceous; mandibles darker. Body dark green to the spiracles; below these the colour is white. Legs white; on the femur is a pale fuscous line; and there is also a fuscous line over the ventral legs. The skin is in folds, the folds being darker at the junction of the segments.

At the last moult the head loses the black mark; the colour of the body becomes paler, and assumes a yellowish tinge, besides becoming more shining.

The larva when not eating remains curled up in a ring on the lower side of the leaf. It does not spin a cocoon.

Kaltenbach says that he found the larva also at the beginning of July, and hence suspects that there are two generations in the year.

I believe *luteolum* will prove to be a common species in the south. There are specimens in Stephens's collection, and it has been taken by Mr. Dale at Glanvilles' Wootton, by Mr. Bridgman at Norwich, and by Mr. Fletcher at Worcester.

It has a tolerably wide European distribution, being found in Sweden, Germany, Holland, Italy and Syria.

2. PŒCILOSOMA CANDIDATUM.

Tenthredo candidata, Fall., Acta Holm., 1807, 105, 40.
— *repanda*, Klug, Berl. Mag., viii, 77, 64; Htg., Blattw., 279, 45.
Selandria bipunctata, Tasch., Ins. f. Gärt., 160 (lar.).
Pœcilosoma candidata, Thoms., Opus., 288, 3; Hym. Scand., i, 230, 3; Voll., Tidj. Ent., xix, 258, pl. x (lar. im., &c.).
Eriocampa repanda, André, Species, i, 319; Cat., 40,* 3.

Black; covered with a short pubescence; labrum, clypeus, mandibles, orbits of the eyes, save a small bit above the antennæ, and legs pale testaceous; tegulæ, the edge of pronotum, a spot on hinder edge of mesopleura, and the edges of all the abdominal segments, white. The greater part of coxæ and femora black. Wings hyaline; costa and stigma dull testaceous. Antennæ not much longer than thorax, the third joint not much longer than fourth, the rest about equal. The second cubital cellule is not much longer than third, and receives the recurrent nervure not far from the middle; the second recurrent is received in the basal third of cellule; transverse median nervure is received a little before middle of cellule. The accessory nervure in hind wing is shortly appendiculated. ♀.

Length 3½ lines.

The larva is dull yellowish-white, yellowish on the head, except the mouth and eye spots which are darker. It lives boring in the pith of rose branches during the second half of May, June, and sometimes on to the first half of July. Towards the middle of April or commencement of May the fly appears, and lays her eggs singly in the point of the young branches. The larva soon bores into the pith, whereby the leaves become withered, and then damage is done to the plant. It eats about an inch and a half into the branch, and when it reaches maturity, bores a round hole in the side of its habitation and drops to the ground, where it spins a cocoon.

Apparently a rare species. The only British locality I know is Oxford where it has been taken by Prof. Westwood. *Cf.* Van Vollenhoven, *l.c.*

3. Pœcilosoma pulveratum.

Plate II, figs. 2 and 2*a*, larva; Plate XX, fig. 8, Saw.

Tenthredo pulveratum, Retz., Degeer, 304; De Geer, Mém., ii, 291, t. 34, figs. 20—25 (lar.); Fall., Acta, 1808, 105, 38; Dbm., Clavis, 34, 53.
— *obesa*, Klug, Berl. Mag., viii, 164; Htg., Blattw., 302, 13 (*Poecilosoma*), Brischke, Beschr., 5, t. i, fig. 1 (lar.).
— *leucozonias*, Htg., Blattw., 290, 15.
Allantus leucozonias, Rudow, S. E. Z., 1871, 137.
Pœcilosoma pulveratum, Thoms., Op., 288, 1; Hym. Sc., i, 229, 2; Cam., E. M. M., xv, 12; Fauna, 19, 1; Voll., Tidj. Ent., xxiii, 7, pl. 2 (lar., &c.); André, Species, i, 332, pl. xx, figs. 4, 6, 8 (lar.); Cat., 42,* 3; *cf.* also Bergman, Wet. Acad. Handl., 1763, 161.

Black, shining, smooth, covered with a close greyish pubescence; tegulæ, edge of pronotum and the abdominal segments at their juncture, white. Legs and apex of abdomen reddish-ochreous. Wings hyaline; costa and stigma sordid testaceous; nervures black at the apex, pale at the base; saw projecting, the sheath black; cerci small; posterior tarsi fuscous; palpi fuscous.

Ab.—*a.* Abdominal segments without white bands.
„ —*b.* Labrum white.
„ —*c.* Anal segment black.
„ —*d.* Apex of posterior femora and tibiæ and tarsi fuscous.
Length 3½—4 lines.

The ♂ of this insect has never been discovered, and there is good reason for believing that parthenogenesis plays a normal rôle with it. This is shown by the following observation. Early in May I found in one of my breeding bottles two ♀ specimens, one dead, the other apparently but newly emerged, and there was no trace of a male. The living specimen was taken out of the bottle and placed under a bell glass along with a fresh sprig of alder. In a short time it layed a number of eggs, most of which produced larvæ, thus showing conclusively that the insect can propagate without having connection with the male.

The manner of oviposition was as follows:—Until placed in the sunshine the insect was very sluggish, but at once on feeling the sunshine became very lively, and flew up and down the enclosure. After a time it discovered the food plant, examined it all over, and ultimately fixed upon a young, half-grown leaf, in which to lay the eggs. At first it rested motionless in the middle of the leaf, then came close to the border, fixed the outer legs along the edge, then raised the body so that it was a little more than the height of the tibiæ above the surface of the leaf. In this position it remained for about a couple of seconds, then the abdomen was bent down, the saw inserted into the leaf and apparently moved up and down, but without being entirely withdrawn out of the leaf. The saw was not inserted straight down, but was a little bent forward, the two sheaths remaining at right angles and not following the position of the saw. After being in the leaf for a few seconds the saw was withdrawn, the insect remained motionless for a second or two, and then the abdomen was again bent down, the saw inserted (but not I think deeply), and the egg deposited. During the egg-laying the antennæ were a little raised above the height of the head with a slight curve, and remained almost rigid. The whole operation lasted about eighty or ninety seconds. Several minutes elapsed before the next oviposition took place. All the eggs were deposited on thick half-grown leaves, sometimes singly, sometimes as many as three on the same leaf. They were placed close to, but not touching any of the nerves, and on the underside of the leaf.

Immediately after being laid they were quite invisible, but by twenty-four hours they had swollen up very much, and were easily noticed as greenish oblong elevations. As the larva came to maturity a small open space separated the egg from the leaf, forming a trench, as it were, round it. With two other experiments I was more successful and managed to rear females from eggs laid by virgin females.

The larva has a long, cylindrical body, narrowed towards the end; the head small, ground colour pale green, bearing a few scattered hairs, and covered with a very fine granular white powder. Body of the same colour as the head, but with a deeper greenish tint; a white line (of the same tint as the head) goes down the sides, and there is another on the back. The skin is in folds and much wrinkled, and like the head is covered with a fine powder. The eyes are black, mouth brown, legs pale green.

At the last moult it loses the green colour, and becomes of a dirty drab colour. Two or three of them feed on the same leaf, resting flat on the underside, and eating roundish holes in the leaf. According to Van Vollenhoven they spin a cocoon, but they never did this with me; even when earth was supplied, they preferred to bore into the cork of the bottle which held them, where they pupated without spinning a cocoon, rather than burying themselves in the earth.

Commonly distributed over Scotland, the imago appearing at the end of May and beginning of June. Norwich (Bridgman).

Continental distribution: Scandinavia, Denmark, Germany, Holland, France, Switzerland, Tyrol.

4. PŒCILOSOMA FLETCHERI.

Plate XI, fig. 4, ♀.

Pœcilosoma obtusa, Thoms., Opus., 289, 5; Hym. Sc., i, 231, 4 (*nec*, Kl.).
— *Fletcheri*, Cam., Fauna, 20, 2; André, Species, i, 332, Cat. 42,* 1.

Antennæ a little longer than the abdomen, almost filiform, attenuate at the apex, slightly pilose, the third joint a very little longer than the fourth, the rest of the joints shorter. Head black, covered with a dense greyish pubescence, the front broadly projecting; antennal foveæ small; labrum and palpi sordid white. Thorax and abdomen shining, covered with a greyish pubescence; tegulæ and edge of pronotum broadly white; cenchri very large, clear white; blotch large. Abdomen short, thick, dilated and obtuse at the apex, and a little projecting above. Saw black, projecting a little. The edges of the segments are broadly white, the anal segment of a dirty luteous colour; the sides are marked with dirty-white splashes between the white segmental marks. Legs covered with a grey pile; coxæ and trochanters black; femora obscure luteous, lined with black above and beneath; tibiæ white at the base, the apex sordid luteous, splashed with black; tarsi fuscous, paler at the base; claws bifid. Wings hyaline; costa at the base pale testaceous; apex and stigma sordid luteous. The tr. radial nervure is received a fourth of the length of the cellule from the apex; the first tr. cubital nervure is absent; the second (first) cellule is a little longer than the third (second), narrow, and having a horny point at its apex; the third (second) is much broader, double the breadth of the base at the apex; the apical cellule is shorter than the preceding.

The ♂ has the femora and tibiæ obscure luteous, according to Thomson.

Length nearly 3¼ lines.

Of similar form to *pulveratum*, but smaller; there are only three cubital cellules; the second (the third in *pulveratum*) is shorter and much broader; the coxæ and trochanters are quite black; the body is more densely pilose, the white marks on the abdomen, too, are broader than those on the sides, being very conspicuous, while they are not found in *pulveratum*. From *Candidatum* it is known by its more pilose body, the eyes not having a white border, and otherwise is easily known by the structure of the posterior wings.

Seemingly a rare species. I have only seen two British specimens, one taken by Dr. Sharp at Braemar, the other by myself at Rannoch.

Thomson has doubtfully adopted the name of *obtusum* for this insect, but it seems to me to be very different from the *obtusum* of Klug. Thus, it has the antennæ as long, if not longer than the abdomen; in *obtusum* they are only as long as the thorax; the clypeus is black, in the other species white; there is a distinct white line on the pronotum; the legs differ in coloration and also the abdomen; and, lastly, Klug's insect is larger than *pulveratum*, while *Fletcheri* is smaller. I can find no record of *obtusum* beyond the original locality given by Klug, namely, Hungary. It is possible that *obtusum* may have been founded on an extreme variety of *pulveratum*, with which, indeed, the description agrees except in one point, namely, the description given of the colour of the legs, which are stated to be "pech brun," which scarcely applies to any specimens of *pulveratum* I have seen; and, as already stated, *obtusum* is said to be a quarter of a line longer in the body, and two thirds in the wings than *pulveratum*.

Continental distribution: Sweden.

5. PŒCILOSOMA GUTTATUM.

Plate XI, fig. 5, ♀.

Tenthredo guttatum, Fall., Acta, Holm., 1807, 105, 39 (*ex parte*).
Pœcilosoma guttatum, Thoms., Opus. Ent., 289, 4; Hym. Scand., i, 231, 5; André, Species, i, 333; Cat., 42,* 4.

Black, ovate, broad, shining, covered (especially the legs) with a slight greyish down; the apex of anterior femora, all the knees, and the tibiæ in front sordid white; the edge of the pronotum has a thin white line; the tegulæ are black. Antennæ a little longer than the abdomen; the third joint is a little longer than the fourth, the fifth, sixth, and seventh are a very little thicker, the eighth and ninth thinner. The abdominal segments are very faintly white at the junction, with faint indications of white between the segments in the middle. The front is smooth, shining, the sutures are invisible, antennal fovea large, ovate, and shallow. Wings faintly black, lighter at the apex; the first tr. cubital nervure is present, the tr. radial is received in the apical fourth of the third cubital cellule; the costa and stigma black, the latter faintly fuscous round the edge. The cenchri are very large, oval, white; blotch rather small; the sheath projecting; hinder calcaria as long as a third of the basal joint of the tarsus. Claws bifid.

Length 3—3½ lines.

This insect is distinguished from *submuticum* by its broadly ovate, short body, blackish wings, thicker and longer antennæ, distinctly bifid claws and longer spurs, shorter and broader third cubital cellule, and smaller and much shallower antennal fovea. *P. longicorne* is longer, less shining, the antennæ thinner and longer, the frontal sutures distinct, and antennal fovea deeper, and the calcaria are shorter.

It appears to be a rare species. I have only seen one British specimen (a ♀). This was taken by Mr. Fletcher at Worcester.

On the Continent it has only been recorded from Sweden, but possibly it is overlooked.

6. PŒCILOSOMA LONGICORNE.

Pœcilosoma longicorne, Thoms., Hym. Scand., i, 232, 6; André, Species, i, 333; Cat., 42,* 5.

Black, shining, pilose on head and thorax, all the knees and anterior tibiæ dirty white, a line on the pronotum clear white, and the abdominal segments as often as not are marked with longish lateral spots of a less clear white; all the segments lined with white at the apices. Wings hyaline, tinged with fuscous on the apical half; costa and stigma black. (For Saw, see Plate XXI, fig. 3.)

♂ similar but the antennæ are as long as the body and the legs in front bear more white.

Length 3—3½ lines.

Similar to *submuticum* but with the body longer and narrower, the antennæ slightly longer and noticeably thinner with the ♀, and distinctly so with the ♂, these organs with *submuticum* ♂ not being much longer than the abdomen, the head is more pilose, the antennal fovea if anything shorter, and the claws almost bifid. Thomson describes the claws as "bifid" in *longicorne*, but all my specimens have one tooth shorter than the other, but still longer than in *submuticum*. I am inclined to believe that the relative length of one of the teeth varies with different specimens. The first cubital nervure is almost always absent, while in *submuticum* it is generally present. The accessory nervure in hind wing is much appendiculated.

Apparently a common species on *Spiræa ulmaria*. I bred it along with the larvæ of *Emphytus calceatus*, but did not have an opportunity of describing the larva. But see p. 217. The imago appears during May and June.

Clydesdale, Norwich.

Continental distribution: Sweden.

7. PŒCILOSOMA SUBMUTICUM.

Pœcilosoma submuticum, Thoms., Hym. Sc., i, 232, 7; Cam., Fauna, 20, 3; André, Species, i, 333; Cat., 42,* 6.

Black, half shining, longish; antennæ as long as the abdomen, edge

of pronotum, knees, and anterior tibiæ white. Abdominal segments broadly marked with longish white marks, spurs very short, claws with a minute subapical tooth. The tr. radial nervure is as in *guttatum*, but the third cellule is as long as the second, while in *guttatum* it is shorter. Cenchri small, antennal fovea large; sheath short. ♀ and ♂.

Length 2½—3 lines.

This species may be known by the first tr. cubital nervure being almost always present, the hinder tibiæ and tarsi quite black, or with only a very small white band on the extreme base, the deep frontal foveæ, short spurs, and claws with a small subapical tooth. The antennal joints are more distinctly separated than in *guttatum*. (For Saw, see Plate XXI, fig. 4.

Ab.—*a*. First tr. cubital nervure absent.
„ —*b*. First tr. cubital nervure absent and no middle cellule in the hind wings.
„ —*c*. Abdomen entirely black.
„ —*d*. Pronotum black.

Nothing very definite is known regarding the larva of this common insect. It is frequently bred from bramble stems, but the larvæ in all probability merely retired there to pass the pupal state. I once bred it along with the *Emphytus calceatus*, and hence suspect that it is attached to *Spiræa*, upon which I have found a larva similar to that of *calceatus* but with black marks along the sides. (See Plate VII, fig. 1.)

Submuticum is one of the commonest species in the genus, and is found almost everywhere in June and late in May.

It is apparently the commonest of the black species on the Continent, but as they are mixed in most collections it is impossible to give the distribution with any exactness.

8. PŒCILOSOMA EXCISUM.

Pœcilosoma excisum, Thoms., Hym. Sc., i, 233, 8; Cam., Fauna, 20; André, Species, i, 334, pl. xx, fig. 2; Cat., 42,* 7.
Harpiphorus vernalis, Diet., M T. Schw., Ent. Ges., 1868, p. 354?

Black, half shining; antennæ shorter than abdomen, the edge of

pronotum, knees, anterior tibiæ and tarsi, the basal half of posterior and the tarsi at the base (broadly) white. Wings greyish—hyaline; the first tr. cubital nervure is generally absent; the costa is sordid testaceous; stigma fuscous to testaceous; the tr. radial nervure is received very near the apex of the third cubital cellule. The sheath scarcely projects. Clypeus deeply emarginated; labrum and palpi pale. The abdominal segments are white at their juncture, rarely have they any other white marks. Tegulæ pale; cenchri small, blotch large.
Length 3¼—3½ lines.

Differs from all the other species of this group by the incised clypeus, whitish tibiæ and tarsi, sordid testaceous costa, half white tegulæ, deeply pilose head and pale palpi and labrum.

Ab.—*a.* Tr. radial nervure interstitial, first tr. cubital nervure present.

I have a specimen intermediate as regards colour between this insect and *submuticum*, having the legs with much less white than in the ordinary form. It has no first transverse cubital nervure.

This is a common Scotch insect, but seems to be rare in England. It is found in June. The ♂ I have never seen, although the female is abundant.

Sweden is the only Continental locality recorded.

9. PŒCILOSOMA NIGRICOLLE, *sp. n.*

Black, pilose; four anterior knees, anterior tibiæ and basal half of tarsi, middle tibiæ in front, and base of four posterior metatarsi testaceous-white. Antennæ very little longer than abdomen, thickish, scarcely tapering towards the apex; clypeus very slightly incised; wings almost hyaline; costa and stigma black, the latter large, broad compared to its length; the transverse radial nervure issues from the lower side, is straight and received in the middle of the cubital cellule; the first transverse cubital nervure is absent, the second (or third) cellule is wide compared to the length, and wider at the apex than base, its basal nervure is almost straight; that at the apex curved, the cubital nervure is scarcely angled where the second recurrent nervure is received. The claws have a blunt tooth not far from the base. ♂.
Length 2 lines.

This little species might be placed in the genus *Harpiphorus*, with which it agrees in the form of the alar neuration, especially in the transverse radial nervure issuing from the stigma at a distance from the costa. It agrees, however, so closely in coloration with the black species of *Pœcilosoma* that it is best included in that genus. From *P. submuticum*, with which it has perhaps the greatest resemblance, it is easily known by its more pilose thorax and head, much shorter and thicker antennæ, more perpendicular transverse radial nervure, slightly shorter metatarsi, as well as by the black pronotum and much thicker stigma.

Rare. Kier Hill, Dumfries-shire, 25th May.

Genus—ERIOCAMPA.

Eriocampa, **Htg., Blattw., 279.**

Wings **with two radial and four cubital cellules; the second and third of the latter receiving each a recurrent nervure. Lanceolate cellule with an oblique cross nervure. Accessory nervure largely appendiculated. Hind wings with both the recurrent and transverse cubital nervures present, or the former only.**

Eyes **not reaching to the base of the mandibles. Clypeus incised or truncated.**

Antennæ **short, the third joint much longer than the fourth; the apical joints attenuated at the apex; the middle ones thickened.**

Claws **bifid at apex. Patellæ developed only on the apical joints of tarsi.**

Body ovate, short.

The species are small, with short, thick bodies, with black, shining bodies and legs, the latter having the tibiæ and tarsi annulated with white at the base, or more or less testaceous, or dull white. In only one species is there any red. The posterior wings have either two middle cellules, in which case the clypeus is incised at the apex, or they have one only when the clypeus is truncated.

Eriocampa has the small, thick-set body form of *Blennocampa*, from which, however, it differs in the form of the lanceolate cellule and of the antennæ. In the form of the lanceolate cellule and partly in the neuration of the hinder wings it agrees with *Poecilosoma*, but that genus has the body longer and more cylindrical, the antennæ not thickened in the middle, nor so sharply pointed at the apex, while the eyes do not reach the base of the mandibles. *Selandria* again, is easily recognised from *Eriocampa* by the lanceolate cellule wanting an oblique cross nervure, the coloration pattern, too, being different in the two genera.

The larvæ are covered with a white flaky powder, or more usually by a black or olive-coloured resinous exudation. In the latter case they are slug-like in shape, very sluggish and more or less gregarious in habit and feed on the upper surface of the leaf.

Ten species of the genus as here restricted have been described from the European fauna, one from Northern China, and six from North America, besides the European *rosæ* and *limacina.*

Synopsis of Species.

1 (2) Thorax red in front. Vertex and cheeks margined. Vertex, scutellum and pleuræ punctured. Blotch absent. Antennæ almost elbowed in the middle and fusiform at the apex. *Ovata.*

2 (1) Thorax black. Vertex and thorax unpunctured; vertex without a border; blotch distinct.

3 (8) Clypeus incised at apex; hind wings with the transverse cubital and recurrent nervures present.

4 (7) Legs annulated with white.

5 (6) Hinder tarsi broadly annulated with white at the base; wings hyaline only at the apex. *Annulipes.*

6 (5) Hinder tarsi not annulated with white; wings hyaline at base and apex. *Varipes.*

7 (4) Legs not annulated with white, the fore legs testaceous in front; wings with a cloud in the middle. *Limacina.*

8 (3) Clypeus truncated at the apex; hind wings with only the recurrent nervure present.

9 (10) Tibiæ white at the base; wings hyaline at base and apex; tr. median nervure received before middle of cellule. *Cinxia.*

10 (9) Fore tibiæ and tarsi testaceous; wings almost hyaline; tr. median nervure received almost in middle of cellule.

11 (12) Posterior tibiæ and tarsi entirely black. *Rosæ.*

12 (11) Posterior tibiæ and tarsi for the greater part testaceous. *Testaceipes.*

1. ERIOCAMPA OVATA.

Pl. XII, fig. 2 ♀ ; Pl. XXI, fig. 6, Saw.

Tenthredo ovata, Lin., F. S., 1553; S. N., Ed., xii, 924, 28; Fab., S. E., 320, 17; Reaum., Mém., iii, 318; De Geer, Mém., ii, 237, 5; t. xxxv, figs. 1—11; Fall., Acta, 1807, 206, 14; Mon., 31, 10; Klug, Berl. Mag., viii, 62, 54; Lep., Mon., 109, 316; Htg., Blattw., 280, 51; Ratzb., Forstin., iii, 132, t. 3, fig. 8; Evers., Bull., Mosc., xx, 32, 15.
— *Gossypina*, Retz., De Geer, 303.
— *hæmatodes*, Panz., F. G., lii, t. 3.
— *leucozona*, Schr., Z. B., ii, 251.
Hylotoma ovata, Fab., S. P., 27, 25.
Selandria ovata, Ste., Ill., vii, 54, 40; Voll., Tidj. Ent., vi, 81—86, pl. 7 (lar., &c.).
Eriocampa ovata, Thoms., Op., 286, 1; Hym. Sc., i, 225, 3; Cam., Fauna, 24, 1; Bridgman, Ent., 1878, 191; André, Species, i, 318, pl. xviii, fig. 3; Cat., 40,* 1.

Black, anterior tibiæ in front, and a thin band on the base of the hinder pair, obscure testaceous. Thorax above from the scutellum sanguineous. Abdomen smooth, shining, almost bare, head and thorax covered with a sparse grey pile. Wings hyaline, a faint fascia below the stigma; nervures, costa and stigma black. ♀.

Length 3½—4 lines.

The ground colour of the larva is light green, the eye spots black, mouth brownish-black, and there is a black spot over the vertex. A short time after its exclusion from the egg the larva becomes dusted all over with a whitish exudation, which on the head does not extend below the eyes. The legs are white with brown claws. As it gets older the white powder develops into a white flaky material, which can be rubbed off; but this is cast at the last moult, when the larva becomes of a shining green colour.

They feed on alder from July to October, eating large holes in the leaves; when not feeding they lie stretched on the lower side of the leaf.

A very common and widely distributed species. The ♂ is quite unknown, and it is very doubtful if it exists. The observations referred to already (*antea*, p. 26) show clearly that complete parthenogenesis occurs with it.

Its nearest ally is *E. umbratica*, Kl., which agrees with it in the form of the antennæ, head and neuration; but it has the vertex and thorax unpunctured, and wants the red on the thorax.

European distribution: Sweden, Germany, Holland, France, Switzerland, Tyrol, Hungary, Russia.

2. ERIOCAMPA ANNULIPES.

Pl. II, fig. 4, 4 *a*, Larva,

Tenthredo annulipes, Klug, Berl. Mag., viii, 70, 49; Htg., Blattw., 279, 46; Evers., Bull. Mosc., xx, 32, 14; Ratz., Forstin., iii, 130, 39, pl. iii, fig. 7.

Selandria annulipes, Ste., Ill., vii, 51, 27; Voll., Tidj. Ent., ii (2), 178—182, pl. 9 (lar., &c.); Ent., vii, 167.

Eriocampa annulipes, Thoms., Opus., 286, 3; Hym. Sc., i, 225, 3; Cam., Fauna, 24, 3; André, Species, i, 321; Cat., 41,* 9.

Black, shining; head covered with a microscopic down; the anterior tibiæ in front, the posterior with a broad basal band, calcaria and the half of the metatarsus of the posterior tarsi, white. Wings smoky, hyaline at the apex.

The ♂ has the antennæ longer and more thickened towards the apex, the third joint is thickened at the apex.

Length 2½—3 lines.

Easily known from all the species by the smoky wings, hyaline at the apex.

Very common, appearing in June and August. The larva is found in July and again in August and September on the lower surface of the leaves of the birch, oak, willow and lime.

The eggs are laid on the under side of the leaf embedded in the epidermis, a hole being left when the larva has left the egg. When young the larva is pale, very shining, and covered with a glistening varnish. The body is very transparent, so that the workings of the internal organs can be seen through the skin, while the intestinal canal appears as a black line when it is filled with food. As the animal grows the head becomes light brown, with darker mouth parts, the eye spots likewise being visible as black spots; the entire head is very shining. The body is dirty yellow (sometimes dirty white), the legs have a yellowish hue, while the slimy substance is more abundant than it was when the larva was young.

In its manner of feeding, pupating, &c., it agrees with the other species. I have not noticed it in any great abundance in Scotland, nor observed it do any appreciable damage to trees; but, according to Ratzburg, damage is done to the lime trees by a number of the larvæ feeding on a leaf, whereby it becomes brown, curled up, and ultimately dies.

It is a species common all over Britain.

Continental distribution: Sweden, Germany, France, Russia.

3. ERIOCAMPA VARIPES.

Tenthredo varipes, Klug, Berl. Mag., viii, 69, 49; Htg., Blattw., 279, 46.
Selandria varipes, Ste., Ill., vii, 51, 28.
Eriocampa crassicornis, Tishbein, S. E. Z., 1846.
— *varipes*, Thoms., Op., 287, 4; Hym. Sc., i, 225, 4; André, Species, i, 323; Cat., 41, 12.

Black; tibiæ white at the base; anterior testaceous at the apex. Wings hyaline, a narrow infuscated cloud below the stigma; the stigma is almost testaceous beneath.

The ♂ is similar, but the posterior wings have the tr. cubital and recurrent nervures at edge of wing, and therefore without a middle cellule.

Length 2¼—2½ lines.

Similar to the preceding, but wings clearer, only smoky in the middle, and the tarsi are black. The structure of the posterior neuration in the ♂ distinguishes it readily.

The larva (which is similar to that of *annulipes*) has been found by Mr. J. E. Fletcher on oak.

Apparently not a common species, and confined principally to the southern counties. It has been found in the London district, at Norwich, Worcester, Dorsetshire.

Continental distribution: Sweden, Germany, Holland, France, Italy.

4. Eriocampa limacina.

Pl. II, fig. 10 and 10 *a*, Larva.

Tenthredo limacina, Retz., De Geer, 313.
— — — De Geer, Mém, ii, 269, pl. 38, figs. 16—25; Reau., Mém., v, 97, t. 12, figs. 1—6.
— *adumbrata*, Klug, Berl. Mag., viii, 64, 56; Htg., Blattw., 280, 48; Evers., Bull. Mosc., xx; Tasch., Ent. f. Gart., 153, figs. 38 and 39; Gorseki, Analecta, i, 186, t. 111, figs. 2 and 2 *a*.
— *cerasi*, Bouché, Naturg., 137; Newman, Ent., viii, 258.
Selandria adumbrata, Ste., Ill., vii, 48, 14; Kalt., Pfl., 174, 207; Voll., Tidj. Ent., xxi, lar. im., pl. i.
— *atra*, West., Ent. Ann., 1862, p. 132; Gard. Chron., 1848, p. 524.
Eriocampa adumbrata, Thoms., Opus., 287, 5; Hym. Sc., i, 226, 5; Cam., Fauna, 24, 2.
— *limacina*, André, Species, i, 322, pl. xviii, figs. 4, 5, 6 and 7; Cat., 41,* 13.
Monostegia antipoda, Kirby, Trans. Ent. Soc., 1881, 50.

Black, shining, pilose; anterior tibiæ testaceous, middle almost fuscous. Wings hyaline, with a broad, smoky band in the middle. ♂ and ♀.

Length 2½ lines.

Distinguished from the foregoing species by the darker colour of the legs, and by the transverse radial nervure being received nearer the third transverse cubital; from *rosæ* by the less deeply emarginated clypeus, and differently coloured wings; and from *Cinxia* by the black tibiæ. Occasionally specimens of both males and females are bred having only one middle cellule in hind wings.

The eggs are laid on the underside of the leaf. When very young the larva is white; then it becomes of a greenish-yellow colour, but this is obscured by a thick, black, olive-coloured resinous secretion, which covers the body all over. It is much broader before than behind; the thorax and base of abdomen, too, being higher than the rest of the abdomen; the thorax arching over the head to a certain extent. Its shape is in fact not unlike a pear, and in its general appearance closely resembles a slug; hence the name given to it of the "slug worm." The head is black, and bears a few hairs; the mouth yellowish; the legs are short and stumpy, and brownish in colour. The ventral legs are coloured like the body. At the last moult the slimy secretion is lost and the head becomes of the same colour as the body; the eye spots being black.

The larvæ feed on the upper side of the leaf usually to the number of three or four. They eat only the upper epidermis; at first the leaf gets eaten in patches, but ultimately every particle of green is devoured so that it has the appearance of having been scorched; and ultimately it falls to the ground. When they appear in great numbers (as they unfortunately too often do) in hot weather, the noise they make in feeding is said to resemble the falling of drops of rain on the leaves. They are very sluggish, and their sluggishness is only surpassed by their voracity. The usual time for the appearance of the larvæ is about the middle of June, and from that time they are found in more or less abundance to the end of September or even October. The small black cocoon is spun in the ground: when the larvæ are very numerous, the cocoons are spun close to each other.

The damage done by these ugly brutes to fruit trees is very often immense; especially is this the case during very dry seasons. They are found on most species of *Pyrus*, *Prunus*, *Cerasus*, *Rubus* and *Amygdalus*, as well as *Cratœgus*, *Quercus*, and *Betula*.

Various remedies have been tried for their extermination, such as sprinkling sand, ashes, lime and powdered hellebore, but with no great success. Good results, however, have been obtained in America by showering a solution of hellebore in water over the infected leaves from the rose of a watering pot. For this purpose a small platform was erected on a cart, which gave the necessary elevation; but obviously only the smaller trees could be reached in this way. The solution consisted of a pound of hellebore to a barrel of water.

As parasites there have been recorded: *Erromenus fumatus*, Brischke; *Tryphon Gorski*, Ratz.; *T. Ratzeburgi*, Gorski; *T. excavatus*, Ratz.; and *T. translucens*, Ratz.

The distribution is general throughout Britain, Europe, and America; while it has made its way into New Zealand.

Obs.—Owing to Linné quoting (but erroneously) Reaumur's observations on *E. limacina*, that species has been very often called *cerasi*, but the true *cerasi*, L. is very different, having the legs and scutellum yellow. What the latter may be I cannot say for certain; but in Linné's collection it is represented by *Lyda sylvatica*, which fits the description well, save only that Linné did not place his *cerasi* among the species with multi-articulate antennæ.

5. ERIOCAMPA CINXIA.

Tenthredo cinxia, Klug, Berl. Mag., viii, 69, 48; Htg., Blattw., 280, 49.
Selandria cinxia, Ste., Ill., vii, 52, 33.
Eriocampa cinxia, Thoms., Opus., 287, 6; Hym. Sc., i, 226, 6
André, Species, i, 322; Cat., 41,* 11.

Black, tibiæ white at the base. Wings almost smoky, paler at the base and apex; the tr. radial nervure received shortly before the third tr. cubital.

Length 2 lines.

Easily known from the preceding species by the truncated clypeus, the first cubital nervure more distinct, the second cellule narrower at the base; from the succeeding it may be known by the tibiæ being white at the base. It is like *varipes* in the coloration of the legs; but the front tibiæ are not so testaceous; it is larger; the radial nervure is received near the cubital;

the third cellule is longer, and the second cubital has a horny point.

Seemingly not a common species. Mr. Fletcher takes it at Worcester, and Mr. Bridgman at Norwich.

Continental distribution: Sweden, Germany, Holland, France.

6. ERIOCAMPA ROSÆ.

Pl. II, fig. 5, Larva; Pl. XII, fig 3, ♀.

Selandria rosæ, Harris, Cat., 1835; Injur. Ins., 416; Norton, Trans. Am. Ent. Soc., i, 257; Cat., 118, 22.
— *aethiops*, West., Gard. Chron., 1848, 524; Ent. Ann., 1862, 132.
Selandria soror, Voll., Tidj. Ent., iv, 123.
Eriocampa livionensis, Gimmerthal, S. E. Z., 1844, 38.
— *nitida*, Tischbein, S. E. Z., 1846, 75; André, Species, i, 320; Cat., 40,* 5.
— *aethiops*, Cam., E. M. M., xii, 192.
Eriocampa caninæ, Cam., E. M. M., xiv, 267.
Eriocampa soror, André, Species, i, 322; Cat., 41,* 14.
— *atratula*, Thoms., Opus., 287, 7; Hym. Sc., i, 226, 7.
Athalia rosæ, Tasch., Naturg., 151, 64 (cf. Cam., E. M. M., xvi, 266).

Black, shining; the knees, the four anterior tibiæ and tarsi white; wings almost smoky, slightly darker at base, having a slight violet tinge. Transverse radial nervure oblique, straight, received close to middle of third cubital cellule.

Length 1¾—2 lines.

This species may be known from *E. cinxia* by having the whole of the anterior tibiæ and tarsi white, instead of only the base of the tibiæ. *E. testaceipes,* again, has no white on the legs, and the posterior are testaceous. The wings in *rosæ* are darker at the base, and do not differ essentially from those of *testaceipes;* in *cinxia* they are different, being darker in the middle.

The larvæ feed on the upper surface of the leaves of the common rose, to which they often do great damage in gardens, by eating the upper skin of the leaves and thus destroying their vitality. The larva is pale yellowish-green with the food canal appearing as a darker stripe down the back. The head is orange.

The eggs are laid in the midrib in May, the larvæ appearing in early summer. The small oval cocoons are spun in the earth. A second brood appears in France during September and October, there being also two broods in America, where it is very destructive to garden roses.

Common in gardens in England and Scotland. I suspect it has been introduced into America from Europe, like the gooseberry grub *Nematus ribesii.*

Continental distribution: Sweden, Holland, France, Germany.

Obs.—This common species agrees tolerably well with the description of *Tenthredo aethiops*, Fab., E. S., ii, 121, 65; S. P., 39, 49, which was described from an insect in the Banksian Collection; but the typical specimen (from England) has been either lost or destroyed. In Europe it was first described by Westwood, who referred it to the *aethiops*, Fab., but long before that it had been described in America by Harris under the appropriate name of *rosæ;* I certainly think the Harrisian name should be adopted, because there is no dispute about it, while the Fabrician description is by no means clear, and the name has been applied to other species. The late Prof. Zaddach informed me that *aethiops* in the Fabrician Collection in Kiel is represented by a *Blennocampa.* The *aethiops* of Klug and Hartig may possibly be the *aethiops* mentioned by Zaddach. It is regarded by Thomson (Hym. Sc., i, 213) as a variety of *Blennocampa eppiphium*, Pz., with the thorax entirely black, but on the other hand, Gorski says that Klug's type of *aethiops* in the Berlin Museum is identical with *E. limacina*, save that it has only one middle cellule in hind wings, and *limacina* certainly has sometimes only one cellule. I have received a "*Blennocampa aethiops*" from several Continental entomologists, but it proved always to be *B. uliginosa*, Schr.

7. ERIOCAMPA TESTACEIPES.

Eriocampa testaceipes, Cam., E. M. M., xi, 129; Fauna, 24, 4; André, Species, i, 322; Cat., 41,* 10.

Black, shining; coxæ, trochanters and basal three-fourths of femora black, the apical fourth, tibiæ and tarsi yellowish-testaceous; apex of hinder tarsi fuscous. Wings slightly longer and narrower than usual, smoky; costa and stigma black; transverse radial nervure received nearly in the middle of the cellule, straight, scarcely oblique. ♂.

Length 2 lines; alar exp. 5 lines.

Differs from *rosæ* in having the wings somewhat longer and narrower, the third cubital cellule is longer, being distinctly longer than the second, which is scarcely the case with *rosæ* on the upper side, by the hinder tibiæ being longer compared to the tibiæ, and by the different coloration of the posterior legs.

I am not sure but *Eriocampa dolosa*, Evers. (Bull. Mosc., xx, 33, 16), is the same species. His description is:—Nigra, nitida, geniculis, tibiis, tarsisque sordide lutescentibus;—alis limpidis, stigmate-radioque fuscis ♀. The term "limpidis" can scarcely be applied to the wings of *testaceipes*, while Eversmann makes no mention of the neuration of the wings (save that there is but one middle cellule in hind wings) nor of the form of the clypeus, so that in the meantime I prefer to retain my own name.

Taken on 6th June on alder at Kilmorack, near Beauly.

Genus—BLENNOCAMPA.

Blennocampa, Htg., Blattw., 266.
Monophadnus, Htg., l. c., 271.
Phymatocera, Dbm., Clavis, 4.
Pectinia (Lep.), Brullé, Hymen., iv, p. 664.

Wings with two radial and four cubital cellules; the second and third of the latter each receiving a recurrent nervure. Lanceolate cellule petiolate. Posterior wings with the transverse cubital nervure always absent, but the recurrent in one section (= *Monophadnus*, Htg.) is present. Antennæ short and thick, or longish and filiform; the third joint longer than fourth, or densely pilose with the third shorter than fourth. Body short, thick, and rather ovoid in form, the abdomen being rarely much longer than the head and thorax.

The neuration is varied as regards the position of the nervures in the different species. The basal nervure is straight and runs parallel with the transverse cubital, or it is curved and not parallel. The transverse median nervure is generally received before the middle of the cellule, but sometimes is received beyond it, *i.e.* nearer the base of the cellule. In *B. betuleti* and *B. nana* the first transverse cubital nervure is absent, or at least is very faint, so that these two species have pretty much the neuration of *Fenusa*, with which they agree in some other respects.

The clypeus is, as a rule, truncated or but slightly emarginated at the apex. The pentagonal area is rarely indicated, but the frontal sutures are distinct. The mandibles are short and broad, and have a tooth not far from the blunt apex; behind the subapical tooth the edge may be indented (see Pl. XII, fig. 12).

The only noteworthy peculiarity as regards the secondary sexual characters is that in one group (*lineolata*) the transverse median and recurrent nervures are situated along the edge.

The larvæ are short and thick compared to their length; in shape they are either cylindrical or flat; in the latter case the body is much broader before than behind, and is covered with a slimy secretion. The cylindrical larvæ have either bare bodies, or bodies covered with long or short, branched, or simple spines. A cocoon is spun in the earth.

By some authors *Blennocampa* is split up into three genera. *Blennocampa* distinguished by having no middle cellule in hind wing; *Monophadnus* by having one middle cellule; and *Phymatocera* (= *Pectinia*) by its long pilose antennæ, which have the third joint shorter than the fourth, the reverse being the case with the other species. I have not, however, adopted *Monophadnus* and *Phymatocera*. From *Selandria* the structure of the lanceolate cellule and the neuration in the hind wings readily separate it; from *Hoplocampa* the same characters distinguish it. Its affinities are undoubtedly strongly with *Fenusa*, from which, apart from its having four cubital cellules, it is very difficult to point to any other absolute marks of distinction, and the difficulty of doing so is further increased by the first transverse cubital nervure in *B. nana* and *B. betuleti* being almost obsolete at least in the middle.

The species of *Blennocampa* have a very wide range, being abundant in the Palæarctic and Nearctic regions, rarer in the Oriental and Australian, and not uncommon in the Neotropical. There are more than fifty European species, while thirty-two have been described from North America, the greater number belonging to the subgenus *Monophadnus*. The neotropical genus *Waldhœmia* is very closely related to the latter, with which it agrees in the neuration, but differs in having the coxæ very large and the antennæ densely pilose, thickened in the middle, and with the four last joints abruptly shorter.

Synopsis of Species.

1 (8) Abdomen reddish.

2 (7) The recurrent nervure in hind wings present.

3 (4) Thorax (and legs) reddish. *Melanocephalus.*

4 (3) Thorax black.

5 (6) Legs reddish. *Fuscipennis.*

6 (5) Legs black. *Nigripes.*

7 (2) Recurrent nervure in hind wings absent. *Assimilis.*

8 (1) Abdomen black.

9 (10) Mesonotum red, legs black. *Eppiphium.*

10 (9) Mesonotum black.

11 (12) Legs testaceous. *Betuleti.*

12 (11) Legs not testaceous.

13 (30) Femora black, tibiæ and tarsi white.

14 (25) Tegulæ and pronotum white.

15 (20) Recurrent nervure in hind wings absent.

16 (17) Wings with a fuscous fascia in middle. *Nana.*

17 (16) Wings hyaline throughout; tr. radial nervure interstitial.

18 (18) Third and fourth joints of antennæ about equal; edge of pronotum broadly white; base of legs white; antennæ as long as body in ♀, in ♂ longer than body. *Alchemilliæ.*

19 (19) Third joint of antennæ distinctly longer than fourth; edge of pronotum scarcely white; legs black at base; antennæ almost shorter than abdomen. *Subserrata.*

20 (15) Recurrent nervure in hind wing present.

21 (22) Transverse radial nervure interstitial; antennæ longer than abdomen. *Ruficruris.*

22 (21) Transverse radial nervure not interstitial; antennæ shorter than abdomen.

23 (24) Third cubital celulle shorter than second, a suture behind the eyes; ♂ with recurrent nervure in middle of cellule. *Bipunctata.*

24 (23) Third cubital cellule longer than second; ♂ with the recurrent nervure in hind wings at edge of wing. *Lineolata.*

25 (14) Tegulæ and edge of pronotum black.

26 (29) Recurrent nervure in hind wings absent.

27 (28) Transverse radial nervure interstitial. *Subcana.*

28 (27) Transverse radial nervure not interstitial. *Pusilla.*

29 (26) Recurrent nervure in hind wings present. *Albipes.*

30 (13) Legs almost entirely black.

31 (32) Antennæ longish, pilose, in both sexes, but especially with ♂; third joint shorter than fourth. *Aterrima.*

32 (31) Antennæ bare, third joint longer than fourth.

33 (36) Knees on all the legs white.

34 (35) Recurrent nervure in hind wings present; transverse radial nervure interstitial. *Geniculata.*

35 (34) Recurrent nervure in hind wings absent; transverse radial nervure not interstitial. *Cinereipes.*

36 (33) Four hind legs entirely black.

37 (38) Recurrent nervure in hind wings absent; a distinct horny point in second cubital cellule. *Fuliginosa.*

38 (37) Recurrent nervure in hind wings present.

39 (42) Third cubital cellule shorter than second on upper side.

40 (41) No suture behind the eyes; abdomen a half longer than head and thorax. *Sericans.*
41 (40) A distinct suture behind the eyes; abdomen not a half longer than head and thorax. *Sulcata.*
42 (39) Third cubital cellule longer than second.
43 (44) Wings clearer at apex than at base; a horny point in second cubital cellule. *Nigrita.*
44 (43) Wings not clearer at base than at apex; no horny point in second cellule. *Micans.*

SECTION 1.—*Posterior wings, with one middle cellule.*

Body, legs and wings entirely black. Antennæ longish, filiform, the joints produced at the apices, pilose, in ♂ densely covered with stiff longish hair; third joint shorter than fourth. Wings with the third cubital cellule much longer than second, dilated at the apex; second transverse cubital nervure oblique, sloping in the opposite direction from the third; first transverse cubital received a little past the middle of the cellule; transverse median nervure received a little in front of middle of cellule; tr. radial received not very far from the third tr. cubital. Accessory nervure in hind wings appendiculated a little beyond the middle. Clypeus truncated at apex. The eyes reach close to mandibles, and they have a longish fovea at the middle behind. Claws bifid (Species 1) (*Phymatocera*).

1. BLENNOCAMPA ATERRIMA.

Pl. XIV, figs. 3, 3*a*, ♂.

Tenthredo aterrima, Klug, Berl. Mag., viii, 81, 79; Htg., Blattw., 276, 36; Evers., Bull. Mosc., xx, 31, 11.
— *fuliginosa*, Fall., Acta Holm., 1808, 109, 45; Bouché, Naturg., 136.
Phymatocera aterrima, Dbm., Consp., 8; Voll., Tidj. Ent., v, 55—59, pl. 2; Zool., S. S., 9471; Tasch., Ent. f. Gärt., 161; Kalt. Pfl., 723.
Selandria Robinsoni, Curtis, Trans. Linn. Soc., xxi, 39—41.
Blennocampa aterrima, Thoms., Opus., 280, 7; Hym. Sc., i, 205, 1; Cam., E. M. M., xiv, 58, 20; André, Species, i, 298, pl. xviii, fig. 13; Cat., 37,* 1.

Black, shining, covered with a close fuscous pubescence; apex of fore femora and tibiæ in front testaceous; wings smoky, iridescent. ♀ and ♂.

Length 3½—4 lines.

The larva is cylindrical, thicker before than behind.

Head black, slightly pilose, and with a horse-shoe shaped impression on the vertex. The ground colour of the body is greyish-white, but it is covered with a bluish powder. Skin much wrinkled and covered on the upper part with black tubercles, each ending in short black spines, which form a sort of crown; the middle spine is the longest. There are three rows of the tubercles on the abdomen on each side of the central furrow; on the fore region they are more numerous and more irregularly arranged. The skin-folds over the abdominal legs are also beset with black spines. Thoracic legs black; those on the abdomen are short, conical, and coloured like the body.

They feed on *Convallaria multiflora*, *C. polygonata*, &c., usually feeding along the edge of the leaf, or more rarely in the centre. When full fed they become entirely bluish-grey, and enter the earth, where a cocoon is spun. They appear in June and July; the imago in the following May.

Found near Putney by Curtis.

Continental range: Sweden, Holland, France, Germany, Italy and Russia.

Body and legs black; knees and four anterior tibiæ testaceous in front. Antennæ shorter than thorax, thick, the third joint about one half longer than fourth. Transverse radial nervure received a little beyond middle of cellule, third cubital cellule almost shorter and much wider than second; tr. median nervure received in front of middle of cellule. Head scarcely dilated behind the eyes; frontal sutures distinct; frontal fovea large, oval; pentagonal area not indicated; clypeus slightly incised. Abdomen longish, sharply pointed at apex (Species 2).

2. Blennocampa sericans.

Tenthredo sericans, Htg., Blattw., 275, 33.
Blennocampa sericans, André, Species, i, 308; Cat., 37,* 7.

Black; sides of abdomen and legs covered with a grey pubescence knees and tibiæ in front whitish-testaceous. Antennæ as long as the head and thorax, thick, bare, the third joint a quarter longer than the fourth; the joints not closely separated. Front smooth, with scarcely any pubescence; the antennal fovea large; frontal sutures clearly defined. Clypeus slightly incised; tips of mandibles piceous. Abdomen longer than the head and thorax, broad in the middle, sharply pointed at the apex; the edges of the segments are white. The breast and pleuræ are smooth and shining; the cenchri are large, white; the blotch is distinct. The legs are covered with a long white pile; the anterior tarsi pale. Wings slightly fuscous throughout; the tr. radial nervure is received a little past the middle of the third cubital cellule; the second cubital cellule has a distinct horny point; the first cubital nervure is received near the middle of the second cubital cellule; the second in the basal fourth; the third cubital cellule is nearly as long as the fourth. ♀ and ♂.

Length 3¾ lines.

The long, pointed abdomen, short antennæ, uniformly coloured wings, as well as the coloration of the legs, will serve to distinguish this species.

Hartig says that the posterior tibiæ in the ♀ are pale, but this is not the case with the specimens I have seen.

Blennocampa monticola, Htg., = *feriata*, Zaddach (Beschr., p. 35), differs from *sericans* in having the third joint of the antennæ double the length of the fourth, while in *sericans* it is not more than a quarter; in *monticola* the antennæ are scarcely longer than the thorax; the legs are shining, black; the apex of femora and the tibiæ externally white, the tarsi are black, the anterior, however, being paler than the posterior.

I have seen several English specimens of *sericans*, but I do not know the precise locality where they were taken.

Continental distribution: Germany, Holland, France.

Black, anterior knees testaceous; wings blackish at base. Antennæ shorter than thorax, thick, third joint double the length of fourth. Third cubital cellule a little longer than second, slightly dilated at apex; second and third transverse cubital nervures with distinct bullæ; tr. median nervure received in middle of cellule. Head dilated behind the eyes; frontal sutures and fovea distinct; pentagonal area confused; clypeus truncated at apex. Eyes reaching close to mandibles (Species 3).

3. BLENNOCAMPA NIGRITA.

Tenthredo nigrita, Fab., S. P., 39, 47; Lep., Mon., 81, 241; Fall., Acta Holm., 1807, 281, 8.
— *nigerrima*, Kl., Berl. Mag., viii, 65, 83; Htg., Blattw., 276, 35; Ratz., Forstins., iii, 132 (lar.); Kalt., 431.
Selandria brevicornis, Ste., Ill., vii, 49, 18.
Blennocampa nigrita, Thoms., Opus., 281, 8; Hym. Sc., i, 209, 6; André, Species, i, 307; Cat., 37,* 2.

Deep black, densely pilose; anterior knees and basal half of tibiæ whitish-testaceous. Antennæ shorter than head and thorax, the joints short and thick, closely united towards the apex; the third joint a little less than double the length of the fourth. Wings fuscous at base, hyaline at apex; nervures black; basal half of stigma fuscous.

The ♂ has the antennæ as long as the abdomen; the third and fourth joints are about equal.

Length 3¾ lines.

The deep black, densely pilose body, with wings fuscous at base only, serve to distinguish this species.

The larva, according to Kaltenbach and Ratzburg, causes damage to ash trees, upon the leaves of which it feeds. It becomes mature at the end of June; pupates in the earth, and appears in the perfect state early next summer.

Not a common species. Mr. Fletcher takes it at Worcester, and it is, I believe, occasionally met with in the London district.

Continental distribution: Sweden, Germany, Holland, France, Tyrol, Hungary.

Black; knees and anterior tibiæ whitish-testaceous in front. Head projecting behind the eyes, which have a longish suture behind them. Eyes not reaching close to mandibles; frontal area and sutures indistinct. Third cubital cellule shorter than second; transverse median nervure received close to middle of cellule. Clypeus with a very slight emargination. Claws simple. Sheath with a projecting point on its upper side (Species 4).

4. BLENNOCAMPA SULCATA.

Blennocampa sulcata, Cam., E. M. M., xviii, 271 (1882).

Black; covered with a silky-greyish or blackish pubescence, which gives the legs a fuscous tint; apical fourth of anterior femora and tibiæ in front, and the four posterior knees dull testaceous-white. Antennæ thickish, not much longer than the head and thorax; third joint about one fourth longer than the succeeding. Head with a deep, longish depression behind the eyes, and slightly projecting behind them; frontal area and sutures indistinct; clypeus very slightly incised. Wings smoky, somewhat darker at base; transverse radial nervure received at apical third of third cubital cellule; transverse median a little in front of middle of cellule; first recurrent a little in front of middle of second cubital cellule; second scarcely so near the middle of the third cubital cellule and not received at such an acute angle as the first is; third cubital cellule short and wide compared to the length, which is a little shorter than second on upper side, but longer on lower; a bulla in first transverse cubital nervure. Claws simple. Abdomen about one-fourth longer than head and thorax; sheath of saw projecting, its upper side produced into a projecting rounded point, and marked with a few longish hairs.

The ♂ is similar in coloration, and has the antennæ a very little longer, and the wings if anything clearer.

Length 2¾ lines.

This distinct species is very closely related to *B. exarmata*, Thoms. (Hymen. Sc., i, 207), olim *monticola*, Opus., 279, 3, *non* Hart., but that has the antennæ filiform, and the third cubital cellule elongated. From *B. micans* it may be known by the eyes not reaching so close to the mandibles, by the indistinct frontal sutures and area, by the deep suture behind the eyes, while the head projects more behind, by the shorter third cubital cellule, the transverse radial nervure is received farther from the third transverse cubital, and consequently the second radial cellule is longer; and lastly, in *micans* the transverse median nervure is received in the middle of cellule, while in *sulcata* it is received a piece in front of middle. *Sericans*, again, is larger, has the abdomen longer compared to the head and thorax, the middle tibiæ and tarsi are distinctly obscure white in front, the antennal fovea longer, there is no suture behind the eye, while the sheath is not prolonged into a projecting point at the upper part, and the saw is longer with better marked indentations. As for the common *nigrita*, the long third cubital and the short second radial cellule at once separate it. *B. monticola*, Htg.=*feriata*, Zaddach, is also related to it, but may at once be distinguished by there being no suture behind the eyes, by the short second radial cellule, by the third cubital cellule being double the length of second, and by the tibiæ being all more or less white at the sides.

Taken among roses at Holgate, York, by Mr. T. Wilson.

Continental distribution: Germany.

Black; knees and anterior tibiæ testaceous. Antennæ short, pilose, third joint about one-third longer than fourth. Transverse radial nervure received not far from third tr. cubital; third cubital cellule much longer than second, dilated, but not very much, at apex; second tr. cubital nervure oblique, not parallel with third which is straight; tr. median nervure received beyond middle of cellule. Accessory nervure in hind wings appendiculated a little beyond the middle. Frontal sutures and pentagonal area well defined; frontal fovea very large. Head not dilated behind the eyes, an indistinct suture at their middle behind (Species 5).

5. BLENNOCAMPA MICANS.

Tenthredo micans, Klug, Berl. Mag., viii, 65, 40; Htg., Blattw., 276, 34.

Blennocampa micans, Cameron, E. M. M., xiv, 57; André, Species, i, 309; Cat., 37,* 8.

Black, almost shining; head, sides of abdomen, and legs thickly covered with long, closely pressed hairs. Knees and anterior tibiæ pale testaceous. Antennæ a little longer than the head and thorax, stout, thickly and closely covered with a stiff black pile, the basal joints distinctly separated from each other, the apical more closely pressed together; the third joint a quarter longer than the fourth; the fourth a little longer than the fifth; the ninth bluntly conical; the antennal furrow very large, deep, somewhat projecting; frontal suture distinct; apex of clypeus and labrum truncated; cenchri large, pale white; blotch distinct. Sheath of saw a very little projecting. Wings pale smoky; costa and stigma dark fuscous; first recurrent nervure received in the middle of the second cubital cellule; second cubital nervure slopes sharply towards the base of the wing, the third slightly towards the apex. Head thick, as broad as the mesothorax. ♂.

Length 2¾—3 lines.

This species is closely allied to *nigrita*, but is smaller, the wings are clearer, and not much darker at the base than at the apex; there is no horny point in the second cubital cellule; the first cubital nervure is more distinct; the frontal and antennal sutures are deeper; the head, legs and sides of abdomen more densely pilose, and generally the body is more shining. In the ♂ the antennæ are shorter than in the same sex in *nigrita*, the joints are more distinctly separated and not so flattened, the third joint is decidedly longer than the fourth, while in *nigrita* they are equal, the fifth being if anything longer than the fourth, while the mesonotum in *micans* is densely pubescent, and scarcely so in *nigrita;* also in the latter the knees only are testaceous; in *micans* the whole of the anterior tibiæ in front are testaceous.

Seemingly rare. Dalry (Sharp), Manchester (Chappell).

Continental distribution: Germany, Holland, France, Tyrol.

Tegulæ, pronotum and posterior legs except at the knees, black. Antennæ longer than abdomen, filiform. Wings smoky, third cubital cellule longer than second; transverse radial nervure interstitial. Basal nervure received a little behind the middle of cellule. Clypeus incised (Species 6).

6. BLENNOCAMPA GENICULATA.

Pl. VII, fig. 3, 3*a*, 3*b*, Larva.

***Tenthredo geniculata*, Htg., Blattw., 274, 31; Evers., Bull. Mosc., xx, 31, 9.**
— *longicornis*, Htg., Blattw., 275, 32; Evers., l.c., 31, 10.
***Monophadnus geniculatus*, Kalt., Pfl., 237, 242.**
***Blennocampa geniculata*, Thoms., Op., 282, 11; Hym. Sc., i, 218, 21; Cam., Fauna, 26, 13; André, Species, i, 308; Cat., 37,* 6.**

Deep black, shining; knees, tibiæ in front and base of hinder tibiæ, slightly white. Antennæ filiform, thin, slightly tapering towards the apex; the third joint is scarcely longer than the fourth. Wings almost fuscous; the radial nervure nearly interstitial; the nervures, costa and stigma are black.

The ♂ has the antennæ nearly as long as the body, thicker and more compressed than in the ♀, and the knees are black.
Length 2¾ lines.

This species may be known from *fuliginosa* (its nearest ally) by its longer antennæ, interstitial tr. radial nervure and clearly white knees.

The larva I find on *Spiræa ulmaria* in June and July, while it feeds also on *Geum urbanum*, *Rubus cæsius* and *dumetorum*, according to Kaltenbach. The head is shining, faintly pilose, greenish-yellow, the yellowish tinge being more intense on the vertex; the eye spots are black and the mouth brownish. The body is dark green, the dorsal canal somewhat darker. On each segment are two rows of double forked spines, one being placed somewhat in front of the other. The spines over the anal segment and also those over the legs are single, while those on the second segment are four-spined. The legs are glassy, yellowish-green, claws brown. Length 5—6 lines. It rests on the underside of the leaves, eating irregular holes and not unfrequently reducing them to a skeleton. It pupates in the earth, and does not appear in the perfect state till the following spring or early summer. At the last moult the spines are cast off, and it becomes of a uniform green colour.

A common species in early summer in Scotland. Mr. Fletcher takes it at Worcester.

Continental distribution: Sweden, Germany, France, Tyrol, Hungary, Russia.

Black; knees, tibiæ and tarsi white. Antennæ short, thick; transverse radial nervure received a little beyond middle of cellule; third cubital cellule much longer than third; tr. median nervure received a piece in front of middle of cellule. Accessory nervure in hind wings longly appendiculated. Clypeus truncated, convex (Species 7).

7. BLENNOCAMPA ALBIPES.

Pl. II, fig. 7 and 7*a*, Larva; Pl. XXI, fig. 5, Saw.

Tenthredo albipes, Gmel., N. S., v, 2667, 126; Klug, Berl. Mag., viii, 67, 34; Htg., Blattw., 272, 23; Evers., Bull. Mosc., xx, 31.
— *morio*, Lep., Mon., 105, 298 (*nec* Fab).
Selandria albipes, Ste., Ill., vii, 49, 19; Voll., Tidj. Ent., t. xiv, 274, pl. xii, figs. 1—7; Kalt., Pfl., 9.
Blennocampa albipes, Thoms., Op., 281, 10; Hym. Sc., i, 217, 19; Cam., Fauna, 26, 12; André, Species, i, 313; Cat., 38,* 22.

Black, shining; knees, tibiæ and tarsi white; the apex of posterior tibiæ and joints of tarsus fuscous. Antennæ as long as the abdomen, moderately thick, a little thickened towards the apex; the third joint one and three quarter times longer than the fourth; the rest a little shorter. Wings almost hyaline; the second cubital cellule is small, with a round horny dot; the third large, not very much dilated at the apex; the radial nervure is received a little past the middle of the third cubital cellule. The saw projects largely, and the blotch is large. ♀ and ♂.

Ab. Tibiæ lined internally with black.

Length 2½—2¾ lines.

The colour of the legs, subhyaline wings and the position of the marginal nervure serve to discriminate this common species.

The larva, according to the observations of Kaltenbach and Vollenhoven, feeds on the leaves of *Ranunculus repens* and *acris*. It is sea green throughout, except on the head which is pale-yellow on the face, brownish or blackish on the vertex. When fully grown the head is shining black. Sometimes, according to Vollenhoven, the larva is more or less orange; and when very young, Kaltenbach says that it is whitish and pilose, the head yellow, with the mouth and eye spots black to brown. It pupates in the earth, where it remains till the following spring.

A very common species, found all over the country.

Continental distribution: Sweden, Germany, Holland, France, Switzerland, Tyrol, Russia.

Tegulæ, edge of pronotum, knees, tibiæ and tarsi white or testaceous-white. Antennæ usually shorter than abdomen, thickish, third joint longer than fourth. Clypeus incised slightly at apex; frontal furrows almost obsolete. Head dilated behind the eyes, a suture behind them at the middle. Wings hyaline, third cubital cellule shorter (*bipunctata*), a little longer (*ruficruris*), or much longer (*lineolata*) than second; tr. radial received a little beyond middle of cellule, or interstitial (*ruficruris*) tr. median nervure received in front of middle of cellule. Transverse nervures in hind wings in ♂ at edge of wing (*lineolata*). Eyes at a slight distance from base of mandibles, but not so high up as in *melanocephalus* (Species 7, 8 and 9).

8. Blennocampa lineolata.

Plate XII, fig. 5, ♀.

Tenthredo lineolata, Klug, Berl. Mag., viii, 76, 62.
Selandria lineolata, Zad., Beschr., 32, fig. 14 (lar.); Giraud, Ann. Soc. Ent. Fr., 51, i, 380—386 (as *bipunctata*); Kalt., Pfl., 664.
Blennocampa lineolata, Cam., Proc. N. H. S. Glas., iii, 109; Fauna, 26, 9.

Black, shining, covered with a close grey pile; abdominal segments lined with a white pubescence; tegulæ, edge of pronotum, knees and tibiæ white; apex of posterior tibiæ and the tarsi fuscous. Antennæ shorter than the abdomen, the third joint one and a quarter times longer than the fourth. Wings hyaline, iridescent; the costa, stigma and nervures black; third cubital cellule much longer than second.
Length 2¾ lines.

This species may be known from *alchemillæ* by the antennæ being shorter than the abdomen; the radial nervure is received near the middle of the third cubital cellule; the second cubital nervure runs parallel with the third and not with the first; the second recurrent is received nearer the second cubital, and the first nearer the first cubital; while there is the decided difference in the neuration of the posterior wings. From *bipunctata* it is readily separated by observing that the third cubital cellule is much longer than the second, the opposite being the case with *bipunctata*, which has it also broader compared to the length; the accessory nervure in hind wings is slightly longer appendiculated. The ♂ of *bipunctata* has the antennæ shorter, thicker, and more compressed than in *lineolata*, and the femora are reddish, lined with black.

The larva appears in June feeding on oak leaves. It is green, with a yellowish dorsal line, through which the food canal shines as a dirty dark green line. On each side of the dorsal line stand five lines of thorns, and next to them, on the sides, are two rows of smaller thorns; while over each proleg are placed two black tubercles, placed one behind the other, the front one bearing a split and the posterior a single thorn. Those on the posterior segments are green; under these are two green single thorns. Upon the last segment are six single thorns arranged in a half circle. The feet have brownish claws, and have, at their base, an irregular brown splash. Head brown, slightly pilose, darker above and at the sides as well as at the mouth; the eye spots are large and black. After the last moult the larva appears deep green with a deep orange-yellow back and dark green dorsal stripes; the head is deep green.

This is not a common species. I have seen it from Worcester, from Perth and Thornhill.

Continental distribution: Germany, France.

9. BLENNOCAMPA BIPUNCTATA.

Tenthredo bipunctata, Klug, Berl. Mag., viii, 215, 172; Htg., Blattw., 273, 26.
Blennocampa bipunctata, Thoms., Op., 279, 4; Hym. Sc., i, 208, 5; Cam., Proc. N. H. S. Glas., iii, 109; Fauna, 26, 10; André, Species, i, 301; Cat., 38,* 24.

Black, shining; tegulæ, pronotum broadly, knees and tibiæ yellowish-white; the tarsi and apex of posterior tibiæ fuscous. The body is covered with a greyish pile; blotch moderately large; abdomen slightly broader in the middle than at the base, narrowing again from the apex of the fourth segment to the apex, which projects sharply above. Wings hyaline and slightly greyish; sometimes the tegulæ are of this colour; third cubital cellule much shorter and wider than second. The palpi are pale.

Length 3¼ lines.

Apparently it is not common in this country. I have only seen two specimens; one from Kinguessie and the other from Rannoch; the former taken on the rose and the other on alder. On the Continent it is found in Sweden, Germany and France.

I do not know that anything for certain can be said to be known regarding its early stages. Dours (Cat. Syn., p. 18) says that the larva feeds on roses, but whether this is an actual observation of his own, or merely copied from Boisduval, I do not know. The last-mentioned author describes the larva as feeding on rose twigs, but the description which he gives of the larva and its habits agrees so closely with that of *Poecilosoma candidatum* that I think he must have mistaken the latter for *bipunctata,* which it is not unlike.

The synonymy of this species is rather confusing. André quotes *lineolata,* Zad., ♀, and *pubescens,* Zad., ♂, as synonymous; but the species I have described above is neither the one nor the other, nor possibly is it even his *bipunctata,* for he describes the ♂ as having an open discoidal cellule. *Lineolata,* Zad., on the other hand, is the same species I have described under that name; while, according to Zaddach, *pubescens* ♂ has an open discoidal cellule, and has, judging from his figure, the third cubital cellule longer, being as long, if not longer, than the second. Giraud (Ann. Soc. Ent. Fr. (5), i, 380—386) says that what Zaddach has described as the ♂ of *pubescens* is the ♂ of *lineolata,* which is, according to him, only a var. of *bipunctata;* but the latter observation is certainly incorrect, although he may be correct in his former statement. André again quotes *albipennis,* Zad., as a synonym of *lineolata,* Kl., Htg., *non* Zad., because, I presume, Hartig makes *lineolata* a *Blennocampa.* If this be really the case then *lineolata,* Zad., Cam., will require a new name; but in the absence of definite information to the contrary (and it must be remembered that practically *lineolata* ♂ is a *Blennocampa,* and that my *lineolata* agrees perfectly with Klug's description, where no mention is made of the neuration of posterior wings), I prefer to retain the name. My *bipunctata* is certainly identical with the *bipunctata* of Klug, Hartig and Thomson.

10. BLENNOCAMPA RUFICRURIS.

Selandria ruficruris, Brullé, Exp. d. Morée, iii, 393, 873; Zad., Beschr., 35.
Blennocampa ruficruris, André, Species, i, 302; Cat., 38,* 26.

Black. Antennæ filiform, thin, of nearly equal thickness, the joints distinctly separated, truncated and enlarged at apex, the third joint curved, a little longer than fourth. Head small, smooth, shining, covered with a very short pale down; sutures scarcely visible; clypeus truncated; palpi pale at the apex. Thorax smooth, shining, scarcely pubescent, the basal half of pronotum broadly, and the tegulæ testaceous; cenchri small, white. Abdomen nearly a third longer than the head and thorax, smooth, shining; saw largely projecting, pilose. Legs: coxæ, trochanters, and basal three-fourths of femora (less than three-fourths of anterior) black, apex of femora, tibiæ and tarsi brownish-testaceous; the apex of tibiæ and the apical joints of tarsi fuscous; spurs very short. Wings subhyaline, costa (extreme base is pale), stigma and nervures black; the second cubital cellule has the upper side longer than the upper side of the third; the lower side is angled where it receives the recurrent nervure, and is shorter than the lower side of the third; the tr. radial nervure is interstitial. In the apical part of the second cubital cellule is a faint dot. The mesonotum (with scutellum) is faintly punctured; the pleuræ are semi-opaque, pubescent.

The ♂ has the antennæ longer than the abdomen and slightly pilose. Length 3½ lines.

Ruficruris comes next to *bipunctata*, but it is larger, the antennæ are thinner, the joints more sharply separated, the colour of the pronotum and tegulæ is different; the first recurrent nervure is received near the middle of the cellule, and not in the basal fourth, and the tr. radial nervure is joined to the third tr. cubital.

Seemingly a rare species. A specimen has been taken by Mr. E. Parfitt in Devonshire, and another by Mr. Bridgman at Norwich.

Continental distribution: Germany, Dalmatia, Morea.

Abdomen, thorax, legs and stigma, rufous; head and antennæ black. Tr. radial nervure received a little beyond the middle of cellule; tr. median in basal third of cellule; accessory nervure in hind wings interstitial; second and third cubital cellules subequal above; third much wider at apex than at base. Antennæ short, filiform; third joint a little longer than fourth; frontal sutures distinct. Clypeus slightly incised at apex; patellæ distinct (Species 11).

11. BLENNOCAMPA MELANOCEPHALUS.

Plate VII, fig. 4, Segment of Larva; Plate XII, fig. 8, ♀.

Tenthredo melanocephalus, Fab., E. S., Supp., 216, 38, 39; Coquel, Icon., i, 16, pl. 3, fig. 6; Panz., F. G., 64, tab. 5; Klug., Berl. Mag., viii, 13; Lep., Mon., 115, 338; Htg., Blattw., 271, 17.
— *albida*, Klug., l. c., 14; Htg., l. c., 270, 13, ♂.
Hylotoma melanocephalus, Fab., S. P., 26, 20.
Selandria melanocephalus, Zaddach, Beschr., 32, fig. 15 (lar.); Voll., Tidj. Ent., viii, 79—83, pl. 4; Kalt., Pfl., 664.
Blennocampa inquilina, Foerster, S. E. Z.; André, Species, i, 305; Cat., 39,* 40.
— *melanocephala*, Thoms., Opus., 279, 1; Hym. Sc., i, 206, 2; Cam., Fauna, 25, 8; André, Species, i, 305; Cat., 39,* 39.

Reddish-testaceous, pilose, shining; head, antennæ, metanotum, a large spot on the sternum, sheath of saw, a few marks on sides and ventral surface of the abdomen, and the legs at the base, black. Abdomen of a paler colour than the thorax; cenchri large. Antennæ as long as the abdomen, the third joint is a little longer than the fourth, the remaining joints taper very slightly towards the apex. Wings hyaline, nervures blackish, costa and stigma pale testaceous.

The ♂ has the thorax black, and the ventral segments of abdomen pale.

Length 3 lines.

The larva is covered with black and green spines, and feeds on the under side of oak leaves. The ground colour is green; the head is green, marked at the sides and on the vertex with fuscous. The black spines are on the back and sides, the green ones over the legs. The former are paler at the base and apex, double pointed, and arise from black tubercles. They are arranged in two rows on a segment, but are not placed exactly opposite each other, and one is placed by itself. On the back there is a clear space in the centre. Over each of the ventral legs are two rows of whitish-green spines, mostly simple. The spines are more numerous and more irregular on the thorax, and less numerous over the last segment, on which they are partly simple, partly bifid. There are six on the second segment, and twelve on segments three and four. On the abdominal segments there are six in each row of the black spines. At the last moult the spines are all thrown off and the larva becomes entirely green. The larva appears in May and June, and pupates in the earth, where a cocoon is spun.

Mesochorus politus, Gr., *Mesoleius formosus*, Holm., *M. armillatorius*, Gr., *Perilissus macropygus*, Hal., *Plectiscus tenthredinarum*, Gir., *Trematopygus aprilinus*, Gir., *T. selandrivorus*, Gir., *Tryphon eppiphium*, Holm., and *T. lateralis*, Gir., have been recorded as parasites, principally by the lamented French entomologist, Giraud.

Commonly distributed in England and Scotland, but seemingly not common.

Continental distribution: Sweden, Germany, Holland, France, Switzerland.

Abdomen luteous; antennæ, head, thorax and legs black. Antennæ short, third joint distinctly longer than fourth. Wings subhyaline; tr. radial received close to the middle of third cubital cellule; tr. median in middle of cellule; third cubital cellule shorter and wider than second; accessory nervure in hind wings appendiculated. Clypeus deeply incised (Species 12).

12. BLENNOCAMPA NIGRIPES.

***Tenthredo nigripes*, Klug, Berl. Mag., viii, 26; Htg., Blattw., 272, 21, ♀.**
— *luridiventris*, Klug., l. c., 27; Htg., l. c., 20, ♂.
***Blennocampa nigripes*, Thoms., Opus., 279, 2; Hym. Sc., i, 207, 3; André, Species, i, 315; Cat., 40,* 44.**

Black, shining; all the knees, the anterior tibiæ in front and abdomen (except at base and apex) dull luteous. Wings tinged with fuscous, costa and stigma dull black, the latter fuscous on the lower side. Antennæ as long as the abdomen and metathorax. Saw largely projecting, black. ♀ and ♂.

Length 2 lines.

This does not appear to be a commonly distributed species. It is in Stephens' collection, but I do not know the locality. Mr. Parfitt takes it in Devonshire, and Mr. Bridgman not uncommonly near Norwich.

Continental distribution : Sweden, Germany, Tyrol, France, Switzerland.

Obs.—There are two Continental species with the abdomen yellow closely allied to *nigripes*, which may be expected to occur here. All have the wings suffused with fuscous, and may be distinguished as follows:

a. Legs black. *Nigripes.*
b. Legs reddish-yellow.
  Abdomen entirely reddish-yellow. *Croceiventris*, Klug.
  Belly only reddish-yellow. *Spinolæ*, Klug.
  Apical segments and a row of spots on back black. *Fuscipennis*, Fall.

Abdomen and legs luteous, thorax and head black. Antennæ short, thick. Wings fuscous; transverse radial nervure received a little beyond the middle of third cubital cellule; tr. median nervure received in middle of cellule; third cubital cellule longer than second, dilated at apex. Claws cleft. Apex of clypeus truncated. Frontal sutures distinct. Body short, thick, covered with a close black pile (Species 13).

13. BLENNOCAMPA FUSCIPENNIS.

Tenthredo fuscipennis, Fall., Mon., 29, 5.
— *luteiventris*, Klug, Berl. Mag., 86, 23; Htg., Blattw., 271, 18; Evers., Bull. Mosc., 30, 6.
Selandria luteiventris, Ste., Ill., vii, 46, 3.
Blennocampa fuscipennis, Thoms., Op., 280, 6; Hym., Sc., i, 212, 12; Cam., Fauna, 25, 7; André, Species, i, 314; Cat., 40,* 45.

Deep black, shining, pubescent, broad, short; the apical half of the four anterior femora, the posterior almost wholly, and the tibiæ and abdomen, luteous; the base and apex of the abdomen and a row of dots along its back black. Antennæ as long as the head and thorax, thickened towards the apex, the two apical joints being thicker than the preceding; the third joint is a little longer than the fourth; the apical joints are more closely united than the basal ones. Wings fuscous, the nervures, stigma and costa black; the tr. radial nervure is received a little beyond the middle of the third cubital cellule.

Length 4—4¼ lines.

Commonly distributed, frequenting marshy places, and generally obtainable by sweeping in June. The larva is not known, and the same may be said of the ♂.

Continental distribution: Sweden, Holland, Germany, France, Switzerland, Tyrol, Russia.

SECTION 2.—*Posterior Wings with no middle cellule.*

Body and legs black, the knees paler, pronotum sometimes reddish. Antennæ shorter than abdomen, thick, not attenuated at the apex. Transverse radial nervure received in apical third of third cellule; tr. median nervure received close to middle of cellule; accessory nervure in hind wing received in middle of cellule; an incipient nervure at base of lanceolate cellule. Wings smoky (Species 14 and 16).

14. BLENNOCAMPA EPPIPHIUM.

Plate XII, fig. 6, ♀.

***Tenthredo eppiphium*, Pz., F. G., 52, t. 5; Klug, Berl. Mag., viii, 61, 32; Lep., Mon., 110, 317; Htg., Blattw., 270, 12; Evers., Bull. Mosc., xx, 30, 5; Fall., Acta Holm., 1807, 207, 15.**
***Hylotoma eppiphium*, Fab., S. P., 27, 28.**
***Phyllotoma eppiphium*, Fallen, Mon., 33, 12.**
***Blennocampa aethiops*, Thoms., Op., 283, 17.**
***Blennocampa eppiphium*, Thoms., Hym. Sc., i, 214, 15; André, Species, i, 310; Cat., 39,* 34.**

Black, shining, scarcely pubescent; knees and base of tibiæ and anterior tibiæ (broadly) white; prothorax and mesonotum (except scutellum) blood red; breast black. Antennæ thick, a little longer than head and thorax; attenuate towards the apex, the third joint a half longer than the fourth, the rest a little shorter. Wings fuscous; the tr. radial nervure is received a little beyond the middle of the third cubital cellule.

Length 2¼ lines.

This little species may be known from *fuliginosa* by its smaller size, shorter antennæ, much longer third cubital cellule, distinct pentagonal area, and by the blood-red coloration of thorax; from *cinereipes* it may be also known by the last-mentioned peculiarity; it has also a narrower, more rounded body, while the scutellum is punctured. The ♂ is very rare.

This seems to be a southern species. It is not uncommon, according to Stephens, in the London districts. I have taken it in Gloucestershire.

Continental distribution: Sweden, Germany, Holland, France, Italy, Russia.

Accessory nervure in hind wings received in apical third of cellule; second cubital cellule with a large black horny point. Pentagonal area indistinct. Clypeus truncated (Species 15).

15. BLENNOCAMPA FULIGINOSA.

Tenthredo fuliginosa, Schr., En., 334, 670; Klug, Berl. Mag., viii, 64, 37; Htg., Blattw., 268, 6.
— *trichocera*, Lep., Mon., 81, 241.
Blennocampa fuliginosa, Thoms., Op., 284, 18; Hym. Sc., i, 215, 16; Cam., Fauna, 25, 6; André, Species, i, 310; Cat., 38,* 10.

Deep black, shining, very slightly pubescent; knees and anterior tibiæ in front brownish-testaceous; mandibles piceous. Wings faintly fuscous. Antennæ a little longer than the head and thorax, thickened towards the apex; the third joint is a little longer than the fourth. In front of the scutellum are two deep punctures.

Length 4¼ lines.

The less pilose body and more uniformly-coloured wings readily separate this species from *nigrita*, while the piceous mandibles and a large, conspicuous, oblong horny point in the second cubital cellule form also distinguishing characteristics.

I believe this is not a common species in the north, but is tolerably abundant in the south.

Continental distribution: Sweden, Germany, Holland, France, Hungary.

16. BLENNOCAMPA CINEREIPES.

Tenthredo cinereipes, Klug, Berl. Mag., viii, 67, 43; Htg., Blattw., 269, 8; Evers., Bull. Mosc., xx, 30, 3.
Selandria cinereipes, Ste., Ill., vii, 51, 26.
Blennocampa cinereipes, Thoms., Opus., 284, 21; Hym. Sc., i, 219, 24; Cam., Fauna, 25, 5; André, Species, i, 309; Cat., 38,* 11.

Deep black, shining; knees and tibiæ broadly white at the apex, anterior tibiæ greyish at the apex. Antennæ a little longer than the thorax, stout, the middle joints sharply divided, the apical ones more compactly pressed together; the ninth joint sharply conical at apex, thinner and longer than eighth; the third a quarter longer than fourth. Wings smoky; tr. radial nervure is received in front of third tr. cubital nervure. Abdomen short, broad, dilated in the middle; blotch large, clear white; terebra slightly projecting. ♀ and ♂.

Length 2—2¾ lines.

A species distinguished by its deep, black, short oval body, thickish antennæ, and the broad white ring at base of tibiæ. At the base of the lanceolate cellule is a curled-up impression of a nervure, which likewise forms a distinctive peculiarity.

It is not uncommon among herbage in May, and appears to have a wide distribution.

Continental distribution: Sweden, Germany, Holland, France, Italy, Hungary, Russia.

Tegulæ and extreme base of pronotum white; apex of femora, tibiæ and tarsi, white. Antennæ longer than abdomen, thin, the third joint longer than fourth. Wings hyaline, third cubital cellule longer than second, dilated at apex; transverse radial cellule interstitial or received in fourth cubital cellule (Species 17 and 18).

17. BLENNOCAMPA SUBSERRATA.

Blennocampa subscrrata, Thoms., Opus., 285, 22; Hym. Sc., i, 220, 25; Cam., Proc. N. H. S. Glas., iii, 129; André, Species, i, 311; Cat., 38,* 14.

Black, shining; head pubescent; tegulæ, extreme edge of pronotum, extreme edge of femora, knees, tibiæ and tarsi, white; apex of posterior tibiæ and apical joints of tarsi (the posterior from second joint), black. Antennæ attenuated at apex, a little longer than the abdomen, the joints a little produced beneath at the apices, the third a very little longer than the fourth. Wings hyaline; tr. radial nervure interstitial the second cubital cellule has a small horny point at the apex; the costa fuscous. The saw projects considerably.

Length 3 lines.

Rare. Worcester.

Continental distribution: Sweden.

18. BLENNOCAMPA ALCHEMILLÆ.

Plate XII, fig 7, ♀.

Blennocampa alchemillæ, Cam., Proc. N. H. Glas., iii, 107
Fauna, 26, 11; André, Species, i, 302, 39, 29.

Black; antennæ filiform, longer than the abdomen; the first joint globular, much longer than the second, the third and fourth nearly equal, the remaining joints nearly equal. Head a little narrower than the thorax, smooth, shining, covered with a fine grey pile; frontal sutures distinct. Tegulæ and basal edge of pronotum white; scutellum flat, very smooth and shining; cenchri small, dull white. Abdomen a very little longer than the head and thorax, saw projecting, hairy at the apex; sides of abdomen covered with a white pile. Legs: base of coxæ, femora for the greater part, extreme apex of posterior tibiæ and apical joints of tarsi black; apex of coxæ, trochanters, knees, tibiæ and base of tarsi, white. Wings clear hyaline; costa at base, and base of stigma pale testaceous; apex of stigma and nervures, black. The tr. radial nervure is interstitial or received in the fourth cubital cellule; the second recurrent nervure is received a very little in the front of cellule; the second cubital cellule is longer and thinner than third, and is angled where it receives the recurrent nervure; the third cellule is wider at apex than at base; the second tr. cubital nervure is bent slightly downwards in the direction of the base of the wing; the third is curved in the middle, and runs in the direction of the apex of the wing.

The ♂ has the antennæ a little longer than the body, covered with a short stiff pile, the joints thicker and more flattened than in the ♀, their general appearance being as in *Priophorus* (*Cladius*); genital parts pale testaceous.

Length 2¼—2¾ lines.

This species may possibly be identical with *B. uncta*, Klug, but Hartig (Blattw., 269) describes the antennæ in the ♂ (the only sex he describes) as "etwas kürzer als der Hinterleib;" and Thomson (Hym. Sc., i, 219) as "longis, abdomine fere longioribus" in both sexes; whereas our species has them longer than the abdomen in both sexes (in the ♂ as long as the entire body). The only other species with which it can be confounded with (belonging to the same section of the genus) is *B. subserrata*, which, however, has the third antennal joint distinctly longer than the fourth, the legs black at the base, the pronotum but very slightly marked with white, cubital cellules broader, &c.

I bred this species from a green spiny larva which fed on *Alchemilla vulgaris*, as described by Degeer

(Mém., ii, 245, 9, t. 35, figs. 19—23) and Reaumur (Mém., v, 94, 95, pl. 12, figs. 13, 14), who, however, had not been able to rear it. It is of the usual form, about four lines long, entirely green, with white forked spines. The head is of a darker green with a yellowish tinge; the eyes black. At the last moult the spines are thrown off, and it becomes of a pale green colour. The pupa state is passed in the earth, the imago emerging in June.

A common species in June. I have taken it on Ben Clibrich, Sutherlandshire, on *Alchemilla alpina.* It is widely distributed in England.

Tegulæ and pronotum black; apex of femora, tibiæ and tarsi, white. Antennæ longish, the joints clearly separated, third joint longer than fourth. Wings almost hyaline, transverse radial nervure interstitial or nearly so; third cubital cellule not much longer than second, considerably widened at apex. Clypeus slightly incised; frontal foveæ distinct (Species 19 and 20).

19. BLENNOCAMPA SUBCANA.

***Blennocampa subcana,* Zaddach, Beschr., 34; Cameron, E. M. M., xiv, 56; Fauna, 25, 4; André, Species, i, 312; Cat., 38,* 19.**

Black, shining; knees slightly, and posterior tibiæ white; anterior tibiæ white in front, black behind; apex of posterior tibiæ and all the tarsi deep fuscous. Head covered with a grey pile; clypeus slightly emarginated at apex; antennæ as long as the abdomen, a little attenuate at apex, the joints distinctly separated from each other, and slightly produced at the apex beneath, the third joint a little longer than the fourth, the last longer and thinner than the eighth. Wings clear hyaline, tr. radial nervure interstitial. Tegulæ black. Saw largely projecting. Cenchri large, clear white.

The ♂ has the antennæ nearly as long as the abdomen and half the thorax, the joints more distinctly separated than in the ♀; and the tibiæ are more or less suffused with fuscous.

Length 3 lines.

Subcana is most nearly related to *pusilla,* from which it is readily distinguished by its much greater size, stouter form, longer and stouter antennæ, the joints being more sharply divided, the more obscure colour of the legs, black tarsi, and generally more deeply coloured costa and stigma. From *Cinereipes* it is known by its longer and less oblong body, lighter coloured tibiæ, clearer wings, interstitial tr. radial nervure, and more projecting saw.

In some males the tibiæ are nearly quite black.

A very commonly distributed species, appearing in May among herbage.

On the Continent it has been recorded from Prussia, and I have seen French examples.

20. BLENNOCAMPA PUSILLA.

Pl. III, fig. 1, Larva, 1*a*, rolled leaf.

Tenthredo pusilla, Klug, Berl. Mag., viii, 62; Htg., Blattw., 267, 2.
Selandria pusilla, Ste., Ill., vii, 52, 32; Voll., Tidj. Ent., iv, 79—83, pl. 3 (lar., &c.); Kalt., Pfl., 221.
Blennocampa pusilla, Thoms., Opus., 285, 23; Hym. Sc., i, 220, 26; Cam., Fauna, 25, 3; André, Species, i, 312; Cat., 38,* 20.

Black, shining; knees, tibiæ and tarsi yellowish-white; the apex of posterior tibiæ and tarsi fuscous; tegulæ black; antennæ a little longer than the abdomen, the joints distinctly separated; the third nearly as long as the fourth; the two basal joints large, the first oval, the second cylindrical; clypeus truncated at apex. Wings fuscous, almost iridescent; the tr. radial nervure is received immediately in front of third tr. cubital, being almost interstitial; stigma large, black; costa black. The terebra projects largely, the apex is sub-acuminate. ♀ and ♂.

Length 2—2¼ lines.

The larva lives in rolled down leaves of *Rosa canina*, the rolling down of the two sides of the leaf being done by itself, but aided by the incision made by the ♀ when laying the eggs, the whole leaf being thereby deformed and converted into a complete cylinder, under the cover of which it lives, but not permanently, as it changes its abode when it no longer affords it nourishment. In this way I have seen the foliage of whole bushes distorted and the vitality of the plant impaired.

The larva is somewhat short and stumpy. Its head is narrower than the second segment, smooth, shining, hairless, fuscous, pale brown, or even white to the middle of the face, below which the colour is white; the mouth is fuscous. The entire body is green; over the feet the skin is much wrinkled; the junction of the segments is white. The legs are green with darker claws; the abdominal legs are greenish-white; the anal ones are well-developed and on walking are slightly raised. Those in front of them are not well developed, or they are hid by the overhanging folds of the body. On the back are short spiny hairs. Length 3—4 lines. They are found in June and July, pupate in the earth, and appear the following May and June.

This is one of the commonest species in the genus. I have seen specimens from all parts of the country.

Continental distribution: Sweden, Germany, Holland, France, Switzerland, Tyrol, Hungary, Russia.

Abdomen black, legs testaceous or white. Antennæ longish, filiform, the joints of nearly equal thickness from the third; wings with the first transverse cubital nervure very faint; the transverse radial nervure interstitial (*betuleti*) or nearly so (*nana*); the median nervure received in middle of cellule (*betuleti*) or nearer the base (*nana*). Claws bifid. Pentagonal area distinct. Eyes greenish (Species 21 and 22).

In the absence of the 1st tr. cubital nervure, or at least in having it very faint, this section approaches *Fenusa*, as it does also in the distinct pentagonal area. In colour, too, the resemblance is very great; *betuleti*, for example, is identical with *Fenusa betulæ*; and *nana* approaches *F. pygmæa.*

21. Blennocampa nana.

Tenthredo nana, Klug, Berl. Mag., viii, p. 72; Htg., Blattw., 266, 1; Thoms., Opusc., 285, 24; Hym. Scand., i, 212, 11; Cam., Fauna, 25, 2; André, Species, i, 302; Cat., 39,* 28.

Oblong, black, shining, glabrous. Antennæ filiform longer than the abdomen, the third joint much longer than the fourth. Tegulæ, pronotum at the base, knees, tibiæ and tarsi, clear white. Saw projecting, semi-curved; apex of abdomen truncated; blotch oblong. Wings hyaline, with a large fuscous blotch in the middle of the anterior; stigma large, fuscous; stigma pale; tr. radial nervure received a little in front of cubital.

Length 2—2¼ lines.

The colour and the broad band in the wings readily distinguish this pretty species.

It does not appear to be very common. I have seen it from the Glasgow district, Kinguessie, Braemar (Sharp), and it has been recorded by Mr. McLachlan from Rannoch.

My specimens have always been taken on birch in June and July. I believe the ♂ is quite unknown.

Continental distribution : Sweden, Germany, France, Russia.

22. BLENNOCAMPA BETULETI.

Tenthredo betuleti, Klug, Berl. Mag., viii, 57; Htg., Blattw., 267, 4.

Selandria betuleti, Ste., Ill., vii, 50, 21.

Blennocampa betuleti, Thoms., Op., 283, 15; Hym. Scand., i, 211, 10; André, Species, i, 316; Cat., 39,* 31.

Black; head and thorax covered with a thick griseous pile; legs testaceous; coxæ, trochanters, and base of femora, black; the apex of hinder tibiæ and the greater part of the tarsal joints fuscous. Antennæ filiform, longer than the abdomen, shortly pilose, the third joint a little longer than fourth. Wings highly iridescent, with a faintly brownish tinge; costa and stigma dull black. The tr. radial nervure is received near the third cubital; the first tr. cubital is faint; tegulæ black. The saw is short, pilose at apex.

Length 2 lines.

There is no British species with which *betuleti* can be readily confounded, but it has a wonderful resemblance to *Fenusa betulæ*, which, however (exclusive of the generic distinctions), may be known from the *Blennocampa* by its deeper coloured wings, pale tegulæ, and much more distinct branchial fork at base of lanceolate cellule.

Betuleti is a rare species. Stephens records it from Darenth Wood, and Mr. Fletcher bred it at Worcester from a larva which fed externally on birch ; this being all that is known of its larval life.

Continental distribution : Sweden, Germany, Holland, France, Tyrol.

Abdomen and legs luteous. Antennæ long, filiform, last four joints abruptly shorter than the others. Transverse radial nervure received a little past the middle of the third cubital cellule; third cubital cellule one fourth longer than second; at the base of lanceolate cellule is a distinct branchial nervure. Wings subhyaline. Claws bifid. Apex of clypeus truncated (Species 23).

23. BLENNOCAMPA ASSIMILIS.

Tenthredo assimilis, Fall., Acta, 1807.
— *hyalina*, Kl., Berl. Mag., viii, 58, 25; Htg., Blattw., 270, 15.
Selandria hyalina, Ste., Ill., vii, 46, 4.
Blennocampa assimilis, Thoms., Opus., 282, 12; Hym. Sc., i, 217, 18; Cam., Fauna, 25, 1; André, Species, i, 317; Cat., 40,* 46.

Black, shining, covered with a short pile; legs and abdomen from the second segment yellow; apex of abdomen, saw and posterior tarsi, black, apical joints of anterior tarsi fuscous. Antennæ a little longer than the head and thorax. Wings hyaline, with a faint smoky tinge; nervures black. At the base of the lanceolate cellule there is a short, turned up commencement of a nervure. Palpi yellowish.

The ♂ is similar, but the antennæ are thicker and the apex of the abdomen is not black.

Length 2—2½ lines.

This is a widely distributed species, the imago appearing in June. According to Dours (Cat. Syn., 18) the larva feeds on *Sorbus aucuparia* and *Prunus padus*, but this requires verification.

In Scotland it has been taken in Clydesdale and in Dumfries-shire; Mr. Fletcher takes it at Worcester and Mr. Dale in Dorsetshire, while it has likewise been taken in the London districts.

Continental distribution: Sweden, Germany, Holland, France, Tyrol, Hungary.

Obs.—Mr. H. T. Stainton sent me a mined leaf of *Tilia Europæa* which was not known to him as being caused by a Lepidopteron. It is very probably that of *Blennocampa tiliæ*, Kalt. (Pfl. 78), a species closely related, if not identical with, if one might judge from the description, *B. assimilis*. According to Kaltenbach the mine commences at the border of the leaf, which is followed for about 1″, but is gradually extended until the whole half side of the leaf is occupied by it. Sometimes there are two larvæ on the same leaf, each occupying a half. The larva is from 3—4‴ long, white, clear, bare and slimy; the food canal appears as a broad greenish stripe. The body is of equa.

breadth, the sides with swollen knotched projections. The head is brown, the eyes black; the mouth of a darker brown than the head. The legs are white. The pupa state is passed in the earth.

The imago is shining black, the abdomen reddish-yellow, save the two basal segments; the legs yellow; the wings a little clouded.

At least that is the way I read the description: "Glänzend schwarz, Beine, Schenkelringe und Hüften gelb;" but André (Species, p. 317) reads it "feet black, coxæ and trochanters yellow." If that is the right translation, clearly the word "Beine" should have been left out, but as it is I can only make it mean that the legs *with* the coxæ and trochanters are yellow, it being a common thing to mention the colour of the coxæ and trochanters, as they are, as a rule, differently coloured from the rest of the legs when these are light coloured—white, yellow, or red.

Genus—HOPLOCAMPA.

Hoplocampa, Htg., Blattw., 276.

Wing with two radial and four cubital cellules. Lanceolate cellule contracted. Hind wings with the recurrent and transverse nervures present. Antennæ short, third—ninth joints almost equal. Eyes oblong, not reaching to the base of mandibles. Clypeus incised. Legs of moderate length, the patellæ small, but distinct; claws with a minute subapical tooth. Cerci long. The subcostal cellule is wide and its cross nervure distinct. The basal nervure is received on the costa a good piece in front of the cubital nervure, and does not run parallel with the transverse cubital. The transverse median is received in the middle of the cellule, and has a distinct "bulla" or clear spot at its lower end; there being also a similar clear space at the upper end of the first recurrent nervure. Accessory nervure in front wings received not far from the end of the 2nd tr. median nervure; in hind wings it is longly appendiculated. In hind wings the recurrent and transverse cubital nervures are almost united.

The species are pale yellow or ferruginous. They are small in size, smooth and shining, seldom or never punctured. The larvæ have from six to seven pairs of ventral legs. They are, as a rule, whitish or yellow in colour, and live either in fruits or in galls. One species (*H. brevis*), however, is green and bears forked spines and lives in the rolled down leaves of the rose.

Hoplocampa forms a connecting link between the *Selandriades* and the *Nematina*, it having almost the neuration of the latter, save as regards the position of the recurrent nervures.

In the position of the basal nervure and in the form of the antennæ it differs from the *Selandriades*, while some at least of the larvæ differ from them, and agree with the *Nematides* in having only twenty feet.

The genus would appear to be confined to Europe and North America. Ten species have been recorded from the former and five from the latter region.

Synopsis of Species.

1 (8) Body yellow on the underside.
2 (3) Meso-metanotum and dorsum of abdomen black. *Testudinea.*
3 (2) Mesonotum and abdomen for the greater part yellow.
4 (5) Mesonotum reddish, punctured; wings with a fuscous cloud. *Ferruginea.*
5 (4) Mesonotum unpunctured; wings unclouded.
6 (7) Yellow; base of abdomen black; wings hyaline; stigma yellow; ♂ dorsum of abdomen black. *Cratægi.*
7 (6) Pallid-testaceous, without black; wings lacteous, stigma white. ♂ immaculate. *Alpina.*
8 (1) Body more or less black on underside.
9 (12) Pleuræ testaceous or luteous.
10 (11) Pale testaceous; antennæ testaceous. *Gallicola.*
11 (10) Luteous; antennæ black. *Pectoralis.*
12 (9) Pleuræ black.
13 (14) Belly testaceous; antennæ and collar black. *Chrysorrhœa.*
14 (13) Belly black; antennæ and edge of collar testaceous. *Rutilicornis.*

1. HOPLOCAMPA TESTUDINEA.

Tenthredo testudinea, Klug, Berl. Mag., viii, 60, 30; Htg., Blattw., 277, 37.
Selandria testudinea, Ste., Ill., vii, 47, 10; West., Gard. Chron., 1848, 851; Ent. Ann., 1862, 134.
Hoplocampa testudinea, Thoms., Opus., 277, 1; Hym. Scand., i, 200, 1; Kalt., Pfl., 201; Tasch., Ent. f. Gärt., 157; André, Species, i, 327; Cat., 41,* 8.

Reddish-yellow, a large spot on the vertex, meso- and metanotum and abdomen above with the sheath black; the middle joints of antennæ fuscous above. Wings hyaline; stigma and nervures at base blackish; apex of stigma yellow. The vertex and mesonotum are finely punctured, almost shining.

Length 3¼ lines.

The largest of the species of *Hoplocampa.* It is most nearly related to *H. brevis,* Klug, which, however, is smaller by a line; the mesonotum is spotted with red; sheath pale, the nervures paler and the antennæ shorter.

According to Westwood the ♀ oviposits in the apple bloom. The larva then takes to the young apples, inside of which it lives. When the apples become as big as walnuts they fall to the ground, carrying the grubs along with them, which then creep out, and enter the ground where they pupate, this taking place at the end of June and beginning of July. A similar account has been given by Dr. Ebrard de Bourg and Delacour de Beauvais (cf. Kaltenbach, l. c.).

This may be (and no doubt is) a common species in gardens, but I have only seen Stephens' specimens (from Hertford) and a specimen taken by Mr. Joseph Chappell in the Manchester distinct. Westwood's observations were made at Hammersmith.

Continental distribution: Sweden, Germany, France, Holland.

2. HOPLOCAMPA FERRUGINEA.

Tenthredo ferruginea, Pz., F. G., 90, fig. 9; Lep., Mon., 115, 337.
Hylotoma ferruginea. Fab., S. P., 27, 24.
Tenthredo brunnea, Klug, Berl. Mag., viii, 16; Htg., Blattw., 277, 38.
Selandria ferruginea, Ste., Ill., vii, 47, 7.
Hoplocampa ferruginea, Thoms., Opus., 277, 2; Hym. Scand., i, 201, 8; André, Species, i, 325, pl. xviii, fig. 1 (im.); Cat., 41,* 1.

Reddish; the posterior edges of mesonotum and metanotum black; tibiæ and tarsi pale. Wings yellowish, with a broad brownish band in the middle; stigma blackish at base; the apex and nervures reddish-yellow. The vertex and mesonotum finely punctured; mandibles piceous.

The ♂ bears three black marks on the mesonotum, and a smaller one on the vertex.

Length 2¼—2½ lines.

The puncturing on the mesonotum is much closer and deeper than in the succeeding species; the colour of the body is redder, the body less shining, and the brownish blotch in the wings affords another good mark of separation.

Not a common species. On roses in June. Norfolk. Darenth (Stephens). Thornhill.

Continental distribution: Sweden, Germany, Holland, France, Switzerland, Tyrol.

3. HOPLOCAMPA PECTORALIS.

Plate XII, fig. 9.

Hoplocampa pectoralis, Thoms., Hym. Scand., i, 202, 6; Cam., Fauna, 27, 3; André, Species, i, 326; Cat., 41,* 7.

Antennæ about the size of the head and thorax, black, the second basal joint luteous beneath. Head black, shining; labrum, clypeus and two spots above the antennæ, reddish-yellow; thorax shining, black; pronotum, pleuræ and sternum, except a black spot in its centre, luteous. Abdomen reddish-yellow, the base marked with black; sheath black. Legs pale reddish-yellow, the apex of posterior tibiæ, and the tarsal joints marked with fuscous. Wings hyaline, the nervures pale luteous, costa and nervures at apex fuscous; base of stigma fuscous. ♀.

Length 2½ lines.

Not common. Clydesdale. London district (Marsh), St. Albans (Marshall), Worcester.

Continental distribution: Gothland.

4. HOPLOCAMPA GALLICOLA.

Hoplocampa gallicola., Cam., E. M. M., xiv, 156; André, Species, i, 324.

Antennæ a little longer than the abdomen, fuscous, paler on the underside, the base of the first joint entirely testaceous, the third a very little longer than the fourth, the rest of equal length and thickness, the ninth conical at the apex. Head globular in front, the face below the antennæ pale white; the apices of the mandibles piceous; vertex faintly punctured. Thorax black; mesonotum smooth, shining; the edge of the pronotum, pleuræ and sternum, pale testaceous. Legs pale testaceous, the apex of the posterior tibiæ and the tarsi fuscous. Wings hyaline, the nervures and costa pale fuscous; tegulæ and stigma pale testaceous; tr. radial nervure received in the apical fourth of the third cubital cellule: the first cubital cellule is nearly square, about half the length of the lower part of the second, which is itself a little shorter than the third on its lower side, and considerably shorter on the upper. The first recurrent nervure is received not far from the first tr. cubital nervure, the second a little in front of the third. ♂.

Length 2 lines.

Readily known from the other black species by the testaceous pleuræ.

The only specimen I have seen was taken by Mr. Ed. Parfitt in Devonshire. Mr. Parfitt believes that it was bred from pea-shaped, woolly-haired galls found on a species of willow. There is nothing anomalous in a *Hoplocampa* being a gallmaker, for Giraud has described* a species (*H. xylostei*) which forms galls on the young branches of *Lonicera xylosteum*, but I am inclined to believe that a mistake has been made in the labelling of Mr. Parfitt's species, for the galls which that gentleman sent me as being those of the *Hoplocampa* were undoubtedly those of a *Nematus*.

5. HOPLOCAMPA CRATÆGI.

Tenthredo cratægi, Klug, Berl. Mag., viii, 54, 18; Htg., Blattw., 278, 41.
Hoplocampa cratægi, Thoms., Opus., 277, 3; Hym. Scand., i, 201, 4; André, Species, i, 326; Cat., 41,* 5.

Pale reddish-yellow; antennæ from the second segment, posterior tarsi and the greater part of posterior tibiæ, fuscous; a small mark on front of mesonotum, a larger one on either side, the metanotum and base of abdomen black. Wings hyaline, costa, stigma and nervures pale reddish-yellow.

The ♂ has the metanotum and the greater part of the dorsum of abdomen black, while the legs are entirely yellowish.

Length 2¼ lines.

The antennæ in this species and in *alpina* are longer than in *ferruginea*, while the colour is paler, the mesonotum is smooth and shining, and the stigma is unicolorous. *Cratægi* is of a redder tint than *alpina*, the colour not being so deluted; the mesonotum shows a trace of puncturing; the mesonotum is always distinctly marked with black, as is also the base of the abdomen, the wings more iridescent, the nervures distinctly traced, while the antennæ and posterior tarsi and apical half of tibiæ are distinctly fuscous. Occasionally the marks on the mesonotum become confluent. The ocelli are placed in a minute brownish splash.

---

* Verh. z. b. Ges. Wien., xiii, 1297, pl. 22.

H. plagiata Klug. (l. c., p. 60), would seem to resemble this species (*cratægi*) closely, if it be not actually identical with it. From Hartig's descriptions the differences between the two would seem to be that the colour in *plagiata* is darker, the stigma reddish-yellow (*cratægi* has the wings clear with "blassem Mahl"), the antennæ brown, while it is half a line larger.

Not common. Boxhill, on flowers of hawthorn (Marshall). Norfolk, Norwich.

Continental distribution: Scandinavia, Germany, Holland, France.

6. HOPLOCAMPA ALPINA.

? *Selandria pallida*, Newman, Ent. Mag., iv, 262.
Tenthredo alpina, Zett., Ins. Lapp., 339, 4.
Hoplocampa alpina, Thoms., Opus., 278, 4; Hym. Sc., i, 202, 5; André, Species, i, 326; Cat., 41,* 6.
— *cratægi*, Cam., Fauna, 26, 1.

Pale testaceous; wings with nervures and costa milk white; antennæ, posterior tarsi, abdomen at apex, one or two marks on mesonotum, sometimes fuscous; tibiæ, tarsi and tegulæ paler than the rest of the body.

The ♂ has the tarsi and antennæ devoid of the fuscous tint.

Length 2¼ lines.

The body is narrower than in the preceding species, the antennæ longer and thinner, the wings if anything larger in proportion, and the saw shorter. The ocelli are not enclosed in a black or brownish spot, the marks on the mesonotum are generally obsolete, while as often as not the antennæ are entirely pale yellow. The ♂ differs from that of *cratægi* in the body being entirely of one colour.

Not common, but commonly distributed, appearing early in June on *Pyrus aucuparia*. Scotland, at Braemar, Altnaharra, Sutherlandshire, and in Clydesdale. I have also seen English specimens in Mr. Marshall's collection, bearing the name of *H. pallida*, Newm., but the description given by Newman is very vague and laconic.

Scandinavia, Lapland.

7. HOPLOCAMPA CHRYSORRHŒA.

Pl. XIV, fig. 1.

Tenthredo chrysorrhœa, Klug, Berl. Mag., viii, 60, 31; Htg., Blattw., 278, 43; André, Species, i, 324; Cat., 41,* 1.

Black, shining; apex of abdomen acuminate; legs long, slender; mouth, belly and legs reddish-yellow; apex of posterior tibiæ and tarsi black; tegulæ pale reddish-yellow. Terebra long, projecting, black at apex. Wings hyaline; costa and stigma pale testaceous; nervures blackish. The tr. radial nervure is received at the apical fourth of third cubital cellule; second recurrent at basal fourth.

Length 1½ line.

Distinguished from *rutilicornis* by its larger size, more pointed abdomen, longer and entirely blackish antennæ, yellowish belly and black posterior tarsi.

Not at all a common species. It has been taken in the London district by Mr. J. G. Marsh.

Continental distribution: Pommerania, Holland, Algeria.

8. HOPLOCAMPA RUTILICORNIS.

Tenthredo rutilicornis, Klug, Berl. Mag., viii, 54, 19; Htg., Blattw., 278, 42.

Hoplocampa rutilicornis, Thoms., Opus, 278, 6; Hym. Scand., i, 204, 8; Cam., Fauna, 27, 2; André, Species, i, 328; Cat., 42,* 11.

Black; antennæ, labrum and clypeus, a spot on pronotum, tegulæ, apex of abdomen and legs pale red. Wings very large, hyaline; nervures, costa and stigma pale yellow. The body is smooth, shining, and covered with a sparse fuscous pubescence.

The antennæ have the middle joints sometimes fuscous above, and the pronotum may want the reddish mark.

Length nearly 1¼ line.

The smallest species in the genus. The ♂ has the three apical segments of abdomen reddish.

Very rare. Dalry, Galloway. Dr. Sharp. Hartig says it appears on *Prunus spinosa.*

Continental distribution: Scandinavia, Germany, France, Tyrol.

Genus—HARPIPHORUS.

***Harpiphorus*, Htg., Blattw., 253.**

Wings with two radial and three cubital cellules; the first and second of the latter receiving each a recurrent nervure. Lanceolate cellule with an oblique cross nervure. Hind wings with only the recurrent nervure present. Antennæ filiform, nine-jointed; the second joint longer than the first; the third not much longer than the fourth; the three last abruptly shorter than the preceding. Legs moderately long; claws bifid. Clypeus slightly incised. The basal nervure is joined to the cubital, a little piece from its origin, and runs parallel with the transverse cubital; the transverse median nervure is received a little piece up from the middle of the cellule; the accessory is appendiculated in hind wing. The subcostal cellule is large. The head has the cheeks bordered, the sutures on the vertex distinct, and there are three oval foveæ above the antennæ. Mandibles short and bifid at the apex. The eyes do not reach to the base of the mandibles.

The body is small, glabrous and shining. Except in having one discoidal cellule in posterior wings, *Harpiphorus* does not exhibit any tangible differences from *Emphytus* as a whole. In body-form and in the structure of the antennæ, it approaches *Hoplocampa.* The genus *Aneugmenus*, Htg.* (type *Tenthredo coronatus*, Klug), differs from *Harpiphorus* in having no oblique cross nervure in lanceolate cellule, and in having two discoidal cellules in the posterior wings. *Aneugmenus*, however, I suspect must be referred to *Selandria*, some of the species of which have the first transverse cubital nervure pellucid or entirely absent, *e.g.*, *S. temporalis* (which agrees not badly with the description of *Coronatus*) and *E. morio.*

Six European species have been referred to *Harpiphorus*, but one or two belong in all probability to *Poecilosoma*, *e.g.* *H. vernalis*, of which one or two of

---

*** Stephens records *Aneugmenus coronatus* from Dover and Darenth, but in error, for no such species (supposing the species to be other than a *Selandria*) exists in his collection.**

the species as already noted want either occasionally or permanently the first transverse cubital nervure. In America *Harpiphorus* is more numerously represented than *Emphytus*, there being eleven species to six of *Emphytus*.

1. HARPIPHORUS LEPIDUS.

Pl. XIII, fig. 4. ♀ 4 *a*, Antenna.

Emphytus lepidus, Klug, Berl. Mag., viii, 277, 191; Htg., Blattw., 253, 25.
Fenusa Ianthe, Newman, Ent. Mag., iv, 261.
Asticta Ianthe, Newman, Ent. Mag., v, 484.
Harpiphorus lepidus, Thoms., Opus., 276, i; Hym. Sc., i, 198, 1; André, Species, i, 242, pl. xvii, fig. 1 (♀); Cat., 29,* 1.

Antennæ as long as the abdomen and metathorax, black or fuscous-black above, testaceous beneath. Head black, the part below the antennæ, a small spot above them, and a band surrounding the upper part of the eyes, dull white. Thorax black, pronotum, the tegulæ and a broad band extending from them to near the scutellum, white. Abdomen black, broadly white at the sides. Legs white, the coxæ and the basal half of femora black. Wings slightly infuscated; costa and stigma yellowish-white.

The ♂ similar, but with the white markings more extended.

Length 2 lines.

Nothing definite appears to be known regarding the life history of this species. Kaltenbach (Pfl., 222, quoting Kirchner) says that the larva lives in the pith of the rose; Dours, on the other hand (Cat. Syn. 17), says that it lives under the dead leaves of oak. It has been bred in this country from the empty galls of *Cynips Kollari* (cf. Fitch, Ent. xiii, 1880, 252) so that it would appear to be attached to oak. *H. lepidus* has been found in the London district, at Glanvilles' Wootton, Dorset, and near Manchester (Mr. Joseph Chappell).

Continental distribution: Scandinavia, Holland, Germany, France.

Genus—EMPHYTUS.

Emphytus, Klug, Berl. Mag., viii, 278; Htg., Blattw., 245.

Wings with two radial and three cubital cellules, the first the longest and receiving a recurrent nervure near the middle, the second receiving the recurrent nervure close to the first transverse cubital. Basal nervure parallel with the recurrent, interstitial, or received not far from the transverse median, which is oblique, and not received in the middle of the median cellule. Lanceolate cellule, with an oblique cross nervure. Hind wings without transverse cubital and recurrent nervures.

Antennæ short, rarely long and filiform; the third joint not much longer than fourth if that. Head cubital, large; eyes projecting; clypeus incised; labrum large, broader than long; palpi long. Legs long, claws bifid, patellæ small; hinder tarsi longer than tibiæ. Mandibles short, broad, with one subapical tooth.

The body is long, cylindrical, with the abdomen cylindrical or slightly depressed. Thorax oblong, with the sutures deep, the scutellum rounded or triangular in front and generally punctured behind; cenchri moderately large or small.

The abdomen is rarely entirely black, more often it is banded with red or white, entirely yellow, or marked with coloured fasciæ. The legs are banded with white, or may be three coloured. With some species the antennæ are annulated with white.

The larvæ are long and cylindrical, generally greenish on the back, lighter at the sides; more rarely they are covered with a white powder. They rest with the body curled up into a ball, the tail turned up in the centre, when not feeding. They do not spin a cocoon, so far as is known. Most of the species bore into stems to pass into the pupa state. Rosaceous plants are what they feed principally upon, although a few are attached to oak.

The genus is characteristic of the Palæarctic and Nearctic Regions. Species are also found in Japan, and one is known from Central America. Thirty-one European species have been described, and six from North America.

Synopsis of Species.

1 (2) **Transverse median and second recurrent nervure interstitial; transverse median nervure in hind wings united with accessory. Antennæ short, slightly compressed at the apex, the fifth to eighth produced beneath at the apices, the third longer than fourth. Clypeus deeply and broadly incised.**

Abdomen white at the base and apex and on the fifth segment. *Togatus.*

2 (1) Transverse median nervure not interstitial.

3 (18) Transverse median nervure received in the basal third of median cellule; the third and fifth joints of antennæ scarcely, if so long as fourth; second cubital cellule much longer than broad.

4 (13) Antennæ shorter than half the body, stout, the three last joints abruptly shorter and produced beneath at the apices; transverse median nervure received a little beyond the middle of median cellule.

5 (12) Second recurrent nervure not interstitial; abdomen with the fifth segment white or red in ♀.

6 (9) Tegulæ white; fifth segment white in ♀.

7 (8) Mouth, edge of ponotum and coxæ, black. *Cinctus.*

8 (7) Mouth, edge of pronotum and coxæ, white. *Cingulatus.*

9 (6) Tegulæ black.

10 (11) Femora black, white at the base. *Rufocinctus.*

11 (10) Femora red, black at base. *Calceatus.*

12 (5) Second recurrent nervure interstitial; abdomen without a coloured band. *Melanarius.*

13 (4) Antennæ much longer than half the body, filiform, the third, fourth and fifth joints nearly equal in length, the third, if anything, thinner than the fourth; transverse median nervure received not far from basal, and second recurrent from first transverse cubital.

14 (17) Abdomen black, antennæ white at the apex with ♀.

15 (16) Apex of hinder femora and tibiæ black, and basal half of hinder tibiæ white; transverse median nervure in hind wing interstitial. *Tibialis.*

16 (15) Apex of hinder femora and the whole of hinder tibiæ red; accessory nervure in hinder wing received a good piece in front of transverse median. *Filiformis.*

17 (14) Abdomen and legs yellow; antennæ entirely black in both sexes. *Serotinus.*

18 (3) Transverse median nervure received in the middle of median cellule; second cubital cellule not much longer than broad, about the same length as the second transverse cubital nervure. Antennæ short, the third joint distinctly longer than fourth, which is of the same length as the fifth; the remaining joints shorter. Clypeus incised, but not deeply. Claws with a minute subapical tooth.

19 (24) Abdomen entirely black.

20 (23) Legs in part white.

21 (22) Scutellum opaque, punctured; hinder femora slightly black at apex; tarsi faintly fuscous at apex. *Grossulariæ.*

22 (21) Scutellum smooth, shining, all the femora broadly marked with black, and apex of hinder tibiæ and tarsi fuscous black. *Carpini.*

23 (20) Legs black for the greater part. *Tener.*

24 (19) Abdomen white beneath, and with reddish marks above; legs more or less yellowish-white. *Perla*

1. EMPHYTUS TOGATUS.

Plate VII, figs. 2, 2 *a*, 2 *b*, Larva; Plate XI, fig. 8, ♀.

Tenthredo togata, Pz., F. G., lxxxii, fig. 12.
Emphytus succinctus, Klug, Berl. Mag., viii, 279, 293; Ste., Ill., vii, 89, 1; Htg., Blattw., 247, 1; Evers., Bull. Mosc., xx, 26, 1; Thoms., Opus., 273, 1; Hym., Scand., i, 88, 1; Kalt., Pfl., 582, 607; André, Species, i, 252; Cat., 31,* 16; var. *Steini*, l. c., 579.
Dolerus togatus, Lep., Mon., 116, 340.

Black, shining, covered with a slight fuscous pile. Antennæ a little shorter than the abdomen, the apex of the fourth and all the succeeding joints reddish-testaceous; the last four joints are much shorter than the others; the basal joint is more than double the length of the second, the third and fourth nearly equal. Head with the frontal sutures distinct; the vertex is slightly raised; the front does not project; labrum reddish. Thorax considerably lengthened and narrowed in front; tegulæ and cenchri white. Abdomen narrow at the base and sharply pointed at the apex; a spot at its junction with the metathorax in front of the blotch (which is also white), a thin band on the fifth segment and a spot at the apex, white. Saw long, half projecting. Legs: coxæ, femora and posterior tibiæ at the apex, black; trochanters and tibiæ white, the apex of tibiæ and tarsi reddish. The mesonotum is very finely punctured. Wings hyaline; stigma at the base sordid testaceous; the two radial and upper part of the two first cubital cellules black; costa fuscous black. ♀ and ♂.

Length 4½—5 lines.

A species easily known from all others by the interstitial median and second recurrent nervures, and by the clouded apex of anterior wings.

The larva has been recorded to feed on birch and willow. Messrs. Fletcher and Fitch have bred it from oak on which the larva feeds in August. For specimens of the larva I am indebted to the former gentleman.

The larva has the upper half of the body dark olive green, greyish white at the sides. The skin is wrinkled, the top of the wrinkles bearing short black tubercles like short spines. The legs white, with brown claws. The upper part of the head is usually more or less black; generally there is a lighter spot at the back, and the black portion divided in two by a light band, but this may be absent. The face is pale, the mouth brownish. At the last moult the head loses the black colour, becoming entirely white.

Its habits are similar to the other species.

It is not uncommon in the London districts, at Worcester, Norwich, Bristol, Devonshire and Paisley.

It has a wide Continental distribution, being found in Sweden, Holland, Germany, France, Italy and Russia.

2. EMPHYTUS CINCTUS.

Plate VI, fig. 4, Larva.

Tenthredo cincta, Lin., S. N., ii, 925.
— *togata*, Zett., Ins. Lapp., 342, 16.
Emphytus cinctus, Klug, Berl. Mag., 279; Ste., Ill., vii, 89, 4; Htg., Blattw., 248, 3; Bouché, Naturg., 139 (lar.); Westwood, G. Chr., 1856, No. 25, 421; Vollenhoven, Tidj. Ent., viii, 73–77, pl. 3 (lar., im., &c.); Thoms., Op., 274, 6; Hym., Sc., i, 189, 2; Kalt., Pfl., 222; Brischke, Beschr., 16, pl. iii, fig. 6; Evers., Bull. Mosc., xx, 26, 2; Cam., Fauna, 20, 1; André, Species, i, 251; Cat., 31,* 17.
Dolerus cinctus, Lep., Mon., 117, 342.

Antennæ black, the apical joints produced on the underside at their apices and a little attenuate; the ninth is much shorter than the eighth and very sharply pointed; the third is a little shorter than the fourth. Head black, shining, covered with a fuscous down, the front projecting; pentagonal area not distinct; palpi fuscous, labrum and apex of clypeus sometimes pale white, generally black; clypeus slightly emarginated; the head is nearly as broad as the mesothorax and considerably emarginated behind. Thorax black, shining, almost glabrous, semi-globular, narrowed in front; sutures of mesonotum deep; cenchri white; scutellum rounded, finely punctured, and with two foveæ in front. Abdomen a little longer than the head and thorax, the apex acuminate, blotch small but distinct, the fifth segment with a white band which does not, however, reach all round; the sheath curved, hairy, a little projecting. Legs black, the posterior coxæ at apex, trochanters, base of femora and apex of all the tibiæ white; the rest of tibiæ and tarsi reddish, apex of tarsi fuscous; calcaria short. Wings hyaline, costa and base of stigma fuscous; the apical part of the stigma black; the radial nervure curved, received a little beyond the middle of the second cellule; the second recurrent is received a very little beyond the first cubital, almost interstitial.

♂ smaller, with no white band on abdomen, the base of tibiæ with no white, and the antennæ thicker.

Length 4—4½ lines.

The larva feeds on the common rose, the leaves of which it eats along the edges, and, when at rest, remains curled up in a ball on the underside of the leaf. The body is stout, cylindrical, but thicker on the thoracic region than towards the tail. The head is light brownish, yellow, or light fuscous; a broad brownish-black band goes from the back of the head to the middle; the eyes black, and mouth dark brown. The upper part of the body is dark green; the sides greyish-white. The skin is wrinkled and beset with small, shining white tubercles. Legs white, with a black-greyish mark over each of them, and white-brown claws.

The larvæ appear from July to October. The eggs are laid on the underside of the leaves, several being laid on the same leaf. As a rule, the larvæ pupate in the rose branches.

Cryptus emphytorum, Boie, is its parasite.

Commonly distributed, especially in gardens.

Continental distribution: Sweden, Germany, Holland, France, Switzerland, Tyrol, Hungary, Russia and Eastern Siberia.

3. EMPHYTUS CINGULATUS.

Tenthredo togata, Fab., S. P., 32, 15, ; nec Panz.
Dolerus cingulatus, Lep., Mon., 117, 243.
Emphytus cingulatus, Ste., Ill., vii, 89, 2; Cam., Tr. Ent. Soc., 1881, 564.
— *togatus*, Klug, Berl. Mag., 280, 195; Ste., Ill., vii, 90, 5; Htg., Blattw., 348, 4 (?).
— *neglectus*, Zad., Beschr., 27.

Black, smooth, shining; palpi, base of mandibles, labrum and clypeus, tegulæ, a broad line on basal half of pronotum, the fifth abdominal segment, the coxæ (except the extreme base which is black), trochanters, basal half of four anterior femora, the basal third of hinder femora and the base of all the tibiæ, white; the rest of the legs pale red, save a thin line on the four front femora, the apical three-fourths of hinder femora, which are black, and the tarsi and apex of hinder tibiæ which are fuscous.

Antennæ nearly as long as the abdomen, the third joint slightly shorter than fourth. Wings clear hyaline, costa fuscous, stigma black, pale at the base; second recurrent nervure received close to first transverse cubital. ♀.

The ♂ similar, but antennæ thicker, the abdomen wants the white band, and the four front femora are lined with black over the apical half.

Length 3½ lines.

Very similar to *cinctus*, but smaller and more slenderly built, the wings clearer, the antennæ longer and thinner, the mouth, thorax and legs marked with white, and the tarsi fuscous. The hinder tarsi, too, are longer compared to the tibiæ, while the blotch is much larger and more distinct, being shaped like a triangle. In *cinctus* it is broader, but not nearly so long nor so wide in the middle.

Tenthredo togata, Fab., is usually regarded as identical with *cinctus*, but I believe it to be the present species, with which the description agrees tolerably well, especially with the words "ore albo," "margine ante alas albo," which do not fit *cinctus*, and are particularly characteristic of *cingulatus*, while the other terms used by Fabricius, "Segmento primo macula magna dorsali," are quite descriptive of the large blotch, and not applicable to the abdomen of *cinctus*; the same may be said (although to a less degree) of the description of the legs, "pallidi femoribus maculis nigris." There can be no doubt about its being the *cingulatus* of Lepelletier and Stephens, only the former has a var. "ore humerisque nigris," which probably belongs to *cinctus*.

Rare compared to *cinctus*: Darenth, Glanvilles' Wootton.

Continental distribution: Germany, France.

4. EMPHYTUS MELANARIUS.

Emphytus melanarius, Klug, Berl. Mag., 282, 200; Ste., Ill., vii, 90, 6; Htg., Blattw., 249, 8 Thoms., Hym. Scand., i, 192, 6; Kalt., Pfl., 222 (lar.); André, Species, i, 247; Cat., 30,* 7.

— *didymus*, Thoms., Opus., 274, 4.

Black, shining; legs red, the extreme apex of posterior coxæ and trochanters white; coxæ and basal half of four anterior femora, with the apex of posterior tibiæ, posterior knees and tarsi, black. Wings hyaline, costa white at base; recurrent nervure interstitial or nearly so. Tegulæ black; palpi fuscous; anterior tibiæ paler at base.
Length 4 lines.

The larva is stated by Kirchner to feed on the rose, and *Campoplex cerophagus*, Grav., is recorded as a parasite.

"Rare: found at Darenth Wood in July" (Stephens).

Continental distribution: Sweden, Germany, France, Tyrol.

5. EMPHYTUS RUFOCINCTUS.

Tenthredo rufocincta, Retz., Degeer, 305.
Emphytus rufocinctus, Klug, Berl. Mag., 286, 210; Ste., Ill., vii, 91, 10; Htg., Blattw., 251, 18; Evers., Bull. Mosc., xx, 28, 10; Thoms., Op., 274, 8; Hym., Sc., i, 192, 7; Kalt., Pfl., 222; Cam., Fauna, 20, 2; André, Species, i, 255; Cat., 31,* 22, cf. also, Goed., Ins., iii, pl. 7; Reaum., Mém., v, pl. 12, figs. 19—21; De Geer, Mém., ii, 467, pl. 35, figs. 14—18.

Black, shining. Antennæ as long as the abdomen, the third joint a very little shorter than the fourth, the four apical joints much shorter than the others, the apices produced on the underside. Tegulæ black; blotch large. Abdomen linear, not much broader in the middle than at base or apex, which is not pointed, the fourth to seventh segments banded with red, sheath large, broad, curved. Legs: four anterior coxæ, trochanters and all the femora, black; apex of posterior coxæ, trochanters and apex of femora, white; tibiæ and tarsi reddish; the posterior tarsi fuscous. Wings hyaline, costa and stigma black. ♀ and ♂.
Length 4½—5½ lines.

Easily known by its elongated body, with the abdomen broadly banded with red, the reddish legs with black femora and white posterior trochanters, &c.

The red band on the abdomen varies in size. Sometimes there are four red segments, in some specimens only two. I have also seen specimens having the anterior trochanters white.

The larva feeds on the common rose and on *Rubus-idæus* during August and September. The larvæ which I have had did not bore into pith although that was supplied, but pupated in the earth where they made a cell, the sides of which were neatly smoothed, and perhaps agglutinated together, at least, the cell held together when separated from the surrounding earth. The other authors who have described its transformations have also given this as its mode of pupation, but as they would not have supplied it with stems, the larvæ may have adapted themselves merely to the altered circumstances. It has the upper part of the body dark greyish-green, in some cases greyish-black, lighter in the centre of the back; the sides, from a little above the spiracles, white. The skin is beset closely with little white tubercles arranged in irregular rows. Head pale orange; eye spots black, mouth pale brown. The upper part of the body varies in the intensity of the colour.

Tryphon extirpatorius, Gr., and *Masicera media,* Goureau, are its parasites.

E. rufocinctus is not, I think, very common. I have taken it in Clydesdale, Rannoch, Braemar and Bonar Bridge. In England it has been taken in Worcestershire, Devonshire, Bristol and the London district.

Continental distribution: Sweden, Germany, Holland, France, Italy, Russia.

6. Emphytus calceatus.

Pl. II, fig. 1, Larva.

***Emphytus calceatus*, Klug,** Berl. Mag., 213, 288; Ste., Ill., vii, 91, 11; Htg., Blattw., 252, 20; Thoms., Hym. Scand., i, 193, 8; Cam., E. M. M., xiii, 199; Fauna, 21, 3; André, Species, i, 256; Cat., 32,* 25.

***Dolerus vicinus*, Lep.,** Mon., 118, 347.

Black, half shining; mesonotum almost opaque, the third joint of antennæ a very little longer than fourth, the two middle segments of

abdomen (fourth and fifth), sometimes part of sixth, reddish-orange. Legs of the same colour; coxæ, trochanters and base of femora (broadly) black; apex of anterior and the greater part of the posterior tarsi fuscous. Mandibles piceous; tegulæ black. Abdomen longish, cylindrical. Blotch invisible. Wings hyaline, a little darker in the centre, nervures and stigma black; costa fuscous. ♀ and ♂.

Length 4—4½ lines.

Var.—a. Abdomen without a red band; posterior trochanters white.

Ab.—b. Posterior trochanters pale; the second cellule as broad at the apex as it is long (in what may be called the type the second cellule is much longer than it is broad at the apex).

The sixth segment is sometimes, wholly or in part, red. *Em. coxalis*, Kl., seems to be an aberration, with the trochanters white and the fifth and sixth segments red.

Easily known from *E. rufocinctus* by its smaller size, shorter antennæ, more obscure, almost opaque mesonotum, red femora, &c.

The larva feeds in June, July, and the early part of August on the leaves of *Spiræa ulmaria*. Its head is deep black, with the oral region paler. The upper part of the body is slaty-black, often with a greenish tinge, the rest of the body with the legs whitish. The skin is wrinkled and furrowed and bears a few hairs. The spiracles are darker than the sides.

In its habits, manner of feeding and pupation it does not differ from the other *Emphyti*.

E. calceatus is a common and widely distributed Scotch species, but appears to be rarer in England. Stephens records it from Darenth and Birch Woods, from Dover and Bristol, and Mr. Dale takes it at Glanvilles' Wootton, and Mr. Bridgman at Norwich.

It seems to be not very common on the Continent, although having a tolerably wide distribution. Sweden, Germany, Holland and France are given as habitats.

7. EMPHYTUS TIBIALIS.

Pl. XIII, fig. 2 ♀.

Tenthredo tibialis, Pz., F. G., 62, 11, 147, 12; Fall., Mon., 41, 14.

Emphytus tibialis, Klug, Berl. Mag., 282, 209; Ste., Ill., vii, 91, 9; Htg., Blattw., 251, 17; Voll., Tidj. Ent., ii, 143—146, pl. 3; Zool. S. S., 8409 (lar.); Thoms., Opus, 273, 2; Hym. Scand., i, 149, 9; Cam., Fauna, 21, 4; André, Species, i; Cat., 30,* 2.

Black; antennæ from the sixth joint to the apex of the ninth and the basal half of tibiæ white; femora red, black at base and extreme apex; apical half of anterior, four posterior tarsi and apical half of posterior tibiæ, black; apical half of four anterior tibiæ reddish-testaceous. Cenchri and blotch white. Tegulæ varying from black to testaceous. Wings hyaline; costa testaceous; stigma black. ♀ and ♂.

Length 4—5 lines.

A very variable species. The tegulæ vary from black to testaceous almost to yellow; the femora are entirely reddish or broadly marked with black at base and apex. The number of joints of antennæ that are white vary also; sometimes the four apical are white, or the ninth may be black, or the eighth and ninth are black, or part of these two and rarely the whole of the apical one are black; the anterior tarsi (usually the first pair are black at the apex, and the second pair quite black) are pale testaceous.

Readily known by the colour of the antennæ and legs.

The larva has been described and figured by Van Vollenhoven. It feeds on the oak in early summer, resting curled up on the upper side of the leaves. It has the segments much wrinkled; the colour is dark olive on the back and pale grey on the rest of the body. Along the back is a pale longitudinal line, and the ground colour above the legs is marked with darker ill-defined spots. The head is on the upper surface clear shining black, and bears some minute shining projecting hairs. The oral region is pale with dark brown trophi. The legs are obscure glassy grey, the thoracic bearing a somewhat curved brown spot, prolonged towards the ends; the claws are brown; over each of the legs is an olive-coloured spot.

After the last moult the colour is much paler, the back brownish-green, the under side of a browner hue, and the head obscure brown.

How and when the eggs are laid I do not know; the insect never appears in the spring, at least, that is my experience; I have always taken it late in autumn, even as late as the second week in October. Nevertheless, Stephens says that it occurs in June and July, the time when the larvæ are found.

It is not uncommon in the west of Scotland. In England it has been found near Worcester, Bristol, the London district, Glanvilles' Wootton, Devonshire and Norwich.

Continental distribution: Sweden, Germany, Holland, France.

8. EMPHYTUS FILIFORMIS.

Emphytus filiformis, Klug, Berl. Mag., viii, 285, 223; Ste., Ill., vii, 90, 8; Htg., Blattw., 251, 15; Evers., Bull. Mosc., xx, 28, 7; André, Species, i, 246; Cat., 30,* 4,
— *apicalis*, Klug, l. c., 285, 208; Htg., l. c., 251, 16.
— *Klugii*, Thoms., Hym., i, 194, 10.

Black, covered with a short down. Tegulæ yellow. Legs yellowish, apical half of anterior tarsi, posterior tarsi wholly, apex of posterior tibiæ broadly and the coxæ, black; tibiæ pale at the base; the four apical joints of antennæ and cenchri white. Wings hyaline, costa fuscous, stigma darker; the nervures are pale at the base.

♂. Antennæ quite black.

Length 4—4½ lines.

Easily distinguished from all the preceding species by the colour of the legs and pilose head, and from the next species (*serotinus*) by the black abdomen.

This is, I believe, not a common species anywhere. I only know of Stephens' specimens which were taken in Darenth Wood in June and July.

It occurs in Sweden, Silesia, Holland, France and Russia.

9. EMPHYTUS SEROTINUS.

Plate III, fig. 12, Larva.

Emphytus serotinus, Klug, Berl. Mag., viii, 288, 215; Ste., Ill., vii, 252, 22; Htg., Blattw., 252, 22; Voll., Tidj. Ent. (2), v, 61—63, pl. 2 (lar.); Kalt., Pfl., 664; Thoms., Opus., 273, 3; Hym. Sc., i, 195, 11; Cam., Fauna, 21, 5; André, Species, i, 258, pl. xvi, figs. 9, 10; Cat., 32,* 28.
Dolerus abdominalis, Lep., F. Fr., pl. 8, fig. 3; Mon., 118, 245,

Black, shining, very slightly pubescent; palpi obscure testaceous, irregularly marked with black at base and apex; abdomen (except at base), legs (except at base and apex of posterior tibiæ and the tarsi, with the sheath, which are all black) yellow. Wings hyaline, costa fuscous, stigma black; nervures pale at the base; tegulæ and posterior calcaria yellow; base of tibiæ pale yellow; blotch and cenchri white. ♀ and ♂. Length 4—5 lines.

Easily known by its shining body, yellow legs and abdomen and black antennæ. *E. cistus*, Klug. (from Austria), differs in having the antennæ white at the base. *E. cerus* (recorded by Stephens from Devonshire, Ill., vii, 92, but probably in error) has a testaceous line on each side of the eyes and the pleuræ yellow.

The larvæ are common in June on the oaks, feeding on the young growing leaves in the usual *Emphytus* fashion. The bare cylindrical body has a light-green ground colour, but this is obscured by a white powder which covers the body all over; the head is also covered with powder, it is dark grey above and pale yellow below the eyes, the eye spots being black. At the last moult the powder is lost; the body becomes yellowish-green and very shining, the head clear yellow, darker on the vertex. With me they pupated in the ground without spinning a cocoon, and yielded the imagos in September and October. The eggs must be laid then, and remain probably unhatched till May, for

I have found newly emerged larvæ on the budding leaves then.

This is a common species in all probability, but seems to be rare in collections, a fact no doubt owing to the imago appearing late in the autumn (end of September and beginning of October: I have taken it even on October 17th), when little collecting is done. It is generally distributed over Scotland; from England I have seen specimens from Worcester, Hereford (Chapman), the London district and Devonshire.

European distribution: Sweden, Germany, Holland, France.

10. EMPHYTUS CARPINI.

Emphytus carpini, Htg., Blattw., 250, 11; Evers., Bull. Mosc., xx, 27, 4; Kalt., Pfl., 81 (lar.); Thoms., Opus., 275, 12; Hym., Scand., i, 196, 13; André, Species, i, 248; Cat., 30,* 8; Cam., Fauna, 21, 6.

Black, shining; tegulæ and legs for the greater part white; femora black, except at the extreme base and apex and sometimes beneath; coxæ at base, apex of posterior tibiæ broadly and hinder tarsi black; the four anterior tarsi fuscous. Scutellum smooth, impunctate; vertex and front shining, but faintly punctured. Wings subhyaline or hyaline; costa fuscous; stigma and nervures black; the tr. radial nervure is received very near the second tr. cubital.

Length 2¾—3 lines.

Of similar size and form to *grossulariæ*, but the coxæ are more broadly black at the base, all the femora are almost entirely black, the apex of the hinder tibiæ and tarsi black; anterior tarsi, and sometimes the apex of tibiæ, fuscous; the vertex is punctured, the scutellum smooth, shining; labrum generally black, and the tr. radial nervure is generally received near the second tr. cubital. The labrum is rarely pale. Another distinguishing point between them is that in *Carpini* the last antennal joint is not longer than the eighth, while this is the case in *grossulariæ* or nearly so.

As in the preceding species the amount of black on the legs varies.

Kaltenbach has described the larvæ. They feed in shady places on *Geranium robertianum.* There are two generations, the one in July, August and September feeding on the radical leaves, the second in October and November on the other leaves, which they eat to the thick nerves; they feed resting on the lower side. The young larva is pale, dirty olive-green above, the head blackish, the vertex and mouth paler or brown. When fully grown they are 6—7‴ in length, round, slim, beset with a few white, small, pointed spines, which are arranged crosswise on each segment, those on the back being the most distinct. The head is shining black, the vertex somewhat hairy, the oral region brownish. The upper part of the body is olive-green to greyish-black; the underside, legs and the lower half of the sides, whitish; the three last abdominal segments are mostly clearer, especially with young specimens.

Dours (Cat. Syn., p. 17) says that the larva feeds on *Sorbus aucuparia*, on which plant the imago was taken by Hartig. I have myself beaten the flies out of the same plant, and also out of hawthorn in June.

Carpini is a common and generally distributed Scotch insect. I have seen many English examples, but do not know the precise localities. Norwich (Bridgman). A Braemar specimen in my collection has the tegulæ black.

European distribution: Sweden, Lapland, Germany, France, Russia.

11. EMPHYTUS GROSSULARIÆ.

Emphytus grossulariæ, Klug, Berl. Mag., viii, 283, 202; Htg., Blattw., 249, 10; Thoms., Opus., 275, 11; Hym. Scand., i, 195, 12; Kalt., Pfl., 261; Tasch., Ent. Gärt., 164; André, Species, i, 250; Cat., 31,* 13.

Black; legs white, posterior femora at the extreme apex and the posterior tarsi pale fuscous. Antennæ short, a little shorter than the abdomen, thickish, the third joint nearly a quarter longer than the fourth, the four apical joints become abruptly shorter. Head faintly punctured, as broad as the thorax, densely pilose; labrum whitish; thorax smooth, shining, slightly pubescent; scutellum almost opaque, punctured; cenchri small. Abdomen longer than the head and thorax; the segmental divisions distinct, sometimes pale; a fourth of the sheath projects; pilose. Legs whitish-yellow, the posterior femora above, at the sides, and sometimes beneath, black or fuscous black; extreme base of coxæ and apex of posterior tibiæ and tarsi more or less fuscous. Wings hyaline or subhyaline; nervures blackish; tr. radial nervure received a little past the middle of the second cellule; the second recurrent is received a fourth in front of the cubital. Tegulæ clear whitish-yellow. Costa fuscous at base.

Length 2¾—3¼ lines.

The amount of black on the legs varies. The labrum is as often black as white.

The larva is stated by Bouché (*see* Hartig, l.c.) and other authors to feed on *Ribes grossularia,* and by the first-mentioned author also on willows. It is greyish-green with the three first and three last segments "pomeranzen gelb;" and over the body are three rows of black tubercles, each ending in a bristle. The head is black. It is said by Bouché to pupate in the ground.

It appears to be not uncommon in many places in the south of England. I have never seen it in Scotland.

Continental distribution: Sweden, Germany, France, Russia.

Obs.—Em. gilvipes, Klug, is probably a variety of *grossulariæ.*

12. EMPHYTUS TENER.

Tenthredo tenera, Fall., Acta, 1808, 29, 109.
Emphytus patellatus, Klug, Berl. Mag., viii, 263, 203; Ste., Ill., vii, 93, 17; Htg., Blattw., 250, 12; Evers., Bull. Mosc., xx, 27, 5; Stein., Ent. Nacht., vi, 247.
Emphytus tener, Thoms., Opus., 275, 13; Hym. Sc., i, 196, 14; Cam., Fauna, 21, 7; André, Species, i, 246, and 578; Cat., 30,* 5.

Black; knees faintly, anterior tibiæ and tarsi obscure testaceous. Head obscure, covered with a short black down, punctured; mesonotum

shining, scutellum opaque at the base. Wings subhyaline; tr. radial nervure is almost interstitial; the second recurrent is received very near the middle of the cellule; tegulæ black. The antennæ are short, thick, the joints distinctly separated, a little produced at the apices on the underside. ♀ and ♂.
Length 2½—3 lines.

Readily distinguished from all the species by its black legs, almost opaque head, short thick antennæ, and interstitial nervure.

The larva, according to Stein, has a bluish-green body, clear lilac beneath and on the sides. The head is clear brown, darker on the vertex, and with black eyespots. Stein found the larvæ in the pith of *Cirsium lanceolatum*, but it is not known if they fed on that plant.

Very common all over Scotland in June; apparently not very abundant in the south. Norwich (Bridgman).

European distribution: Sweden, Germany, France, Russia.

13. EMPHYTUS PERLA.

Pl. XI, fig. 9 ♂.

Emphytus perla, Klug, Berl. Mag., viii, 289, 217; Ste., Ill., vii, 89, 3; Htg., Blattw., 252, 24; Bouché, Naturg. 140 (lar.), Kalt., Pfl., 237; Thoms., Hym. Scand, i, 197, 15; Cam., Fauna, 21, 8; André, Species, i, 257; Cat., 32,* 26.
Emphytus Bohemani, Thoms., Opus., 275, 10.

Black, covered with a grey pubescence, mouth, tegulæ, a broad line on the pronotum, a broad irregular band on the pleuræ, belly, coxæ and trochanters, white; femora and four anterior tibiæ and tarsi yellowish-white; the femora with a reddish tinge; the four hind tibiæ and tarsi lined with fuscous; blotch large, white. Abdomen above reddish, the two basal segments black; along the sides are four triangular black marks, their pointed ends facing the centre. Head a little punctured. Wings hyaline, costa, nervures and stigma fuscous; the radial nervure is received a little beyond the second cubital or interstitial.
Length 2½—3 lines.

Bouché is the only author who has described the larva. He says that it closely resembles the larva of

E. cinctus, but it wants the pale black stripe, and over the legs there is only one row, but of larger black spots. It is also smaller and more slender.

It lives on *Rubus idæus*, in the stems of which it bores to pass the pupal state, boring into the pith to a depth of from one to a foot and a half.

Bouché bred *Ichneumon bituberculatus* from it.

In Britain *E. perla* appears to be rare. I have taken it at Rannoch. Mr. Bridgman takes it at Norwich, Mr. Dale at Glanvilles' Wootton, Stephens records it from Hertford, and Mr. T. Wilson has captured it near York.

Genus—PHYLLOTOMA.

Phyllotoma, Fall., Mon. Tenth. Suec., 1829.
Heterarthus, Ste., Ill., vii, 94.

Wings with two radial and three cubital cellules, the first and second of the latter receiving each a recurrent nervure; the second cubital as long, if not longer, than the first; transverse radial, and recurrent nervures received not far from middle of cellules; transverse basal nervure in part received in front of stigma; transverse median usually beyond the middle. Lanceolate cellule with an oblique cross nervure; there are no median cellules in hind wings; the accessory nervure is longly appendiculated. Stigma large.

Antennæ filiform, ten to fifteen-jointed, the third joint longer than fourth.

Head broad compared to length, concave behind, the front slightly projecting, but retreating between the antennæ and the eyes, which are prominent, oval, and placed at a distance from the mandibles. Clypeus truncated. Mandibles weak, sharply pointed at the apex, a slight indentation in the middle. Palpi long, maxillary with the first joint small, second more than double its length, but a little shorter than the third, the fourth is the longest, the sixth a little longer than the fifth. Labial palpi have the first joint a little shorter than the second, the three succeeding of nearly equal length, the last thinner.

The *legs* are longish, especially the hinder pair; the tarsi have no patellæ, the claws bifid, somewhat dilated at the base.

The *abdomen* is broad, scarcely rounded on the back; the blotch is distinct; the saw short and broad.

The head and thorax are black, usually more or less marked with white; the abdomen is either black entirely or black marked at the sides with white, or it may be entirely luteous. The legs are white or pale yellow, with the species having the abdomen black;

those with it luteous have pale yellow legs. The wings are rarely hyaline, they are more usually smoky throughout or in part.

The larvæ are very similar in form and coloration. They are depressed, flattish, broader before than behind; the head is small, sharply pointed in front, almost triangular, and capable of being withdrawn to a certain extent into the folds of the second segment. The legs are short, squat and knob-like, the abdominal are very slightly developed. The colour is white, the back appearing greenish when the food canal is filled. The head is brown, darker at the sides, around the mouth it is reddish-brown; eye spots black; mandibles brown. On the back of the second segment is a dark brown plate, rounded at the sides and divided in the middle. On the same segment beneath is a horse-shoe or dumbbell-shaped black plate, narrow at the base, spreading out on both sides at the apex. On the next two or three segments, also on the underside, there is, on each in the centre, a round brown dot. At the last moult these markings are cast off; the head is then very pale brown with darker mandibles.

In habits the larvæ of the various species are as similar as are they in form and coloration. The female lays her eggs on the top or sides of a leaf. When the larva escapes from the egg it eats its way into the parenchyma, and soon eats an irregular roundish blotch between the lower and upper epidermis, which become so transparent that the creature inside can be readily seen by holding the leaf to the light. There may be only one larva in a leaf or several; in the latter case the blotches, at first distinct, become in course of time united. The larvæ are very cleanly in their habits, insomuch as they open the leaf at the edge and expell the "fass" through this opening. When full fed they spin, attached to the sides of the mine inside the leaf, a round, flat cocoon, usually dark brown in colour, in which they become pupæ. There are usually two generations in the year.

A very distinct genus of small extent (there being only seven species known) and confined to Europe.

Synopsis of Species.

1 (6) Abdomen black.
2 (5) Antennæ ten to eleven-jointed, body oblong, half depressed, black above and beneath; pronotum and tegulæ white. Legs white. Wings for the greater part hyaline.
3 (4) Wings with a smoky fascia in the middle, sides of abdomen with white marks. *Nemorata.*
4 (3) Wings without a fascia; abdomen without distinct white marks. *Aceris.*
5 (2) Antennæ twelve to thirteen-jointed. Abdomen entirely black, or white underneath. Legs pale yellow, black at the base. Wings smoky, clear at the apex. *Ochropoda.*
6 (1) Abdomen luteous; wings nearly smoky throughout; legs luteous, body scarcely depressed.
7 (8) Antennæ ten to twelve-jointed, black at the base; pronotum and tegulæ black. *Vagans.*
8 (7) Antennæ fourteen to fifteen-jointed, pale at the base; pronotum and tegulæ black. *Microcephala.*

1. PHYLLOTOMA NEMORATA.

Pl. XIII, figs. 6, 6 *a*, ♀; Pl. IV, fig. 3, Mine.

Tenthredo nemorata, Fall., Acta Holm., 1808, 47, 23.
Druida parviceps, Newman, Ent. Mag., iv, 261; l. c., v, 484; Healy, Ent., No. 62, 208.
Phyllotoma tenella, Zad., Beschr., 28, pl. 1, fig. 17; Voll., Tidj. Ent., xviii, 39—42, pl. 4.
Phyllotoma nemorata, Thoms., Hym. Sc., i, 176, 1; Cam., Proc., N. H. Glas., ii, 317; Fauna, 23, 1; Tr. Ent. Soc., 1880, 77; André, Species, i, 235; Cat., 28,* 1.

Black, shining. Antennæ shorter than the abdomen, ten to eleven-jointed, fuscous beneath; inner orbits of the eyes and face yellowish-white; a black line above the epistoma; mandibles piceous, palpi white. Pronotum and tegulæ white; cenchri large, dull white. Abdomen with the sides marked with white, usually oblong dots. Legs white; base of coxæ and femora black. Wings hyaline at the apex, a little infuscated at the base and with a large smoke-coloured fascia extending from the stigma to the bottom of the wing.

Length 2—2½ lines.

The ♂ is unknown. I have got virgin females to lay fertile eggs, and in one experiment bred two females (April, 1882).

The egg is deposited near the edge or tip of a birch leaf, in which the larva lives afterwards as a solitary miner. There are two broods in a year, the first in June and July; the other later on in the autumn, the larvæ being found as late as October.

It is a commonly distributed species, occurring from the London district to the north of Scotland.

Continental distribution: Sweden, Germany, Holland.

2. PHYLLOTOMA ACERIS.

Phyllotoma aceris, Kalt., Pfl., 91; McLachlan, E. M. M., iv, 104; Healy, l. c., 107; Cam., Proc. N. H. S. Glas., ii, 318; André, Species, i, 236; Cat., 29,* 5.

Black, shining. Antennæ ten to twelve-jointed, fuscous testaceous at the apex. Wings half smoky; pronotum lined with white; tegulæ obscure white; abdomen black, except that the edges of the segments are sometimes faintly white, but there are no distinct dots. Legs white, femora for the greater part black.

Length 1½—1¾ lines.

The ♂ I have never seen. The face has more black on it than in *nemorata*, there being no white above the antennæ.

The larva mines the leaves of the maple in June and July. It is common in the London district, and probably elsewhere. At Brussels in 1877 it appeared in great abundance, so much so that considerable damage was done to the trees, nearly every leaf, even those growing fifty feet up the trees, being mined by the larvæ, which curiously enough only appeared in that district for the first time in that year. Cf. McLachlan, E. M. M., xiv, 120.

Continental distribution: Germany, Belgium.

3. PHYLLOTOMA OCHROPODA.

Plate XIII, fig. 5, ♂.

Emphytus ochropodus, Klug, Berl. Mag., viii, 182; Htg., Blattw., 255, 1.

Heterarthrus ochropodus, Ste., Ill., vii, 94.

Phyllotoma ochropoda, Thoms., Hym. Sc., i, 177, 2; Cam., Proc. N. H. S. Glas., ii, 318; André, Species, i, 235; Cat., 28,* 3.

Black, shining; inner orbits of the eyes, labrum, clypeus partly, palpi and trochanters, white. Legs pale yellow, verging to testaceous; coxæ and base of femora black. Wings dark smoky, apex hyaline.

The ♂ has the antennæ thirteen-jointed, thicker and longer than in the ♀; the two basal joints are white, the others dull brown; the face has a greater amount of white than in the ♀; the pronotum, pleuræ and tegulæ are clear white; the base of coxæ, trochanters, extreme base of femora and the under side of abdomen white. Wings almost hyaline, with a faint cloud in the middle.

Length 2¼ lines.

From *nemorata* and *aceris*, *ochropoda* may be known by the colour of the legs, the black tegulæ and pronotum (in the ♀), and the greater number of joints in the antennæ.

The larva mines the leaves of the aspen (*Populus tremula*) in the autumn.

Apparently a rare species. Worcester.

Continental distribution: Sweden, Germany.

4. PHYLLOTOMA VAGANS.

Plate VI, fig. 5, Larva.

Hylotoma vagans, Fall., Acta. Holm., 1808, 47, 24.
Emphytus melanopygus, Klug, Berl. Mag., viii, 275, 185; Htg., Blattw., 256, 4.
„ *amaurus*, Klug, l. c., 186; Htg., l. c., 265, 5.
Phyllotoma melanopyga, Kalt., Pfl., 620; Voll., Tidj. Ent., i (2nd Ser.), 196—201, pl. 8; Ent., No. 102, 70—74.
„ *microcephala*, Healy, Ent., No. 60, 177.
„ *vagans*, Thoms., Hym. Sc., i, 178, 3; Cam., Proc. N.H.S. Glas., ii, 319; Fauna, 23, 2; André, Species, i, 236, pl. xiv, figs. 5 and 6; Cat., 29,* 6.

Antennæ about the length of the abdomen, ten to twelve-jointed, black, pilose, the two basal joints of nearly equal size, the first having a short pedicle at the base, the third double the length of the fourth, which is longer than the second basal; the remaining joints to the penultimate become a little shorter, the last is conical, thinner and longer than the preceding. Head not much narrower than the thorax, much broader than long; eyes projecting, front depressed; frontal and vertical sutures distinct; clypeus notched; labrum semicircular, slightly pubescent. The colour of the head is black, save the inner orbits of the

eyes and sometimes the labrum and clypeus and the space between the antennæ, which are dirty yellow. Legs yellowish, tarsi darker. Abdomen luteous, the apex black above. Wings smoky, tegulæ black. The ♂ has one more joint in the antennæ than the ♀; they are also testaceous beneath, and the abdomen has the dorsal surface black.
Length 1¾—2½ lines.

This species is very variable in coloration, some specimens having the head and abdomen almost entirely black. I have one ♂ from Clydesdale which is half the usual size; the wings are almost hyaline, and the basal half of the femora and the hinder tarsi are black.

The larva mines the leaves of the alder, in which it lives alone or in company with two or three others. Two broods are met with, the autumnal one being the most numerous. It is an abundant species everywhere. *Campoplex cerophagus*, Gr., and *Chrysocharis albipes*, Gir., are given by Giraud as parasites.

Continental distribution: Sweden, Germany, France, Russia.

5. PHYLLOTOMA MICROCEPHALA.

Plate III, figs. 10 and 10*a*, Lar.; Plate II, fig. 6 *b*, Cocoon.

Emphytus microcephalus, Klug, Berl. Mag., viii, 275, 184; Htg., Blattw., 255, 3.
Phyllotoma microcephala, Kalt., Pfl., 581; Thoms., Hym. Sc., i, 179, 4; Cam., Fauna, 23, 3; André, Species, i, 237; Cat., 29,* 7.
„ *melanopyga*, Healy, Ent., iv, 176—178 (l. h.).

Black, shining. Antennæ fourteen-jointed, two basal joints dull white; a line round the inner orbits of the eyes, labrum, clypeus, sometimes the epistoma, mandibles at the base and palpi, white or yellowish white. Tegulæ and edge of pronotum white. Abdomen luteous, apex more or less black, sheath of saw hairy, more or less projecting. Legs pale luteous. Wings smoky, apex almost hyaline.

♂. Antennæ fifteen-jointed, black, testaceous beneath; sides of thorax more or less yellowish-white, face with more white than in the ♀, and the dorsal surface of the abdomen is more or less black.
Length 2—2¾ lines.

Microcephala is easily known from *vagans* by having the antennæ fourteen-jointed (in ♀), with the scape pale, the pronotum and tegulæ white, wings clearer at the apex than at the base, and the apex of the sheath hairy, while it is bare in the alder miner.

The larva mines the leaves of various willows. Common and generally distributed.

Continental distribution: Sweden, Germany, France.

Genus—FENELLA.

Fenella, Westwood, Intr., ii, Append., 54.

Wings with two radial and three cubital cellules, the first longer than the second, the first and second receiving each a recurrent nervure. Lanceolate cellule petiolate. Posterior wings with no middle cellule.

Antennæ ten to fourteen-jointed, the third longer than the fourth.

Eyes reaching to the base of the mandibles, which are short and thick.

The sutures on the vertex and front are deep, the palpi are short, six-jointed, the clypeus truncated. The basal nervure is curved; the abdomen is short, thick, not much longer than the head and thorax. The transverse radial nervure is either interstitial or received in the third cubital cellule. The body is deep black, pilose on the head and antennæ; the tibiæ and tarsi are usually lighter coloured than the femora. The wings are more or less smoky.

The larvæ are similar in form and habits to those of *Fenusa*, only they are not attached to trees.

Four European species are known. The genus would appear to be confined to Europe.

Synopsis of Species.

1 (2) Wings smoky, posterior tarsi and tibiæ black; antennæ ten-jointed. *Westwoodi.*

2 (1) Wings subhyaline, tibiæ and tarsi white; antennæ eleven to twelve-jointed. *Nigrita.*

1. FENELLA NIGRITA.

Fenella nigrita, West., Int., ii, Synop., 54; Thoms., Op., 27, 2; Hym. Sc., i, 280, 1; Cam., P. S. N. H. G., iii, 15; André, Species, i, 233, pl. xiv, fig. 2 (♀); Cat., 28,* 1.

Fenusa pygmæa, Healy, Ent., v, 300 (l. h.); Kalt., Pfl., 225, 227.
Phyllotoma tormentillæ, Healy, Ent., iv, 135.
Fenella tormentillæ, André, Species, i, 233; Cat., 28,* 2.
Melinia minutissima, Costa, Fauna di Napoli, 41, pl. lxvi.

Black; mouth and antennæ underneath fuscous; knees, tibiæ and tarsi, white; trochanters pale fuscous. Wings hyaline, slightly infuscated, iridescent; costa and stigma pale fuscous; tegulæ black, transverse radial nervure received a little beyond the second tr. cubital nervure.

Length 1¼ line.

The larva mines the leaves of *Agrimonia Eupatoria* and *Potentilla reptans*, forming small brownish blotches, each leaf sometimes containing, according to Healy, fourteen larvæ, but the number is generally much less. There are two broods in the year, the first in early summer, from which the imagos appear at the end of June; the second in the autumn.

The larva is white. The head light brown, with darker mouth parts and black eye spots. Beneath, on the second segment, is a large black mark occupying nearly its whole extent; on each of the three following segments is an irregularly-shaped black mark. Above, on the second segment, there are two large marks, somewhat square in shape but rounded off at the outer corner, and like the other marks black. Legs encircled with brown. When the food canal is filled the body has a greenish tinge, the canal appearing as a broad green stripe. The pupa stage is passed in the ground.

F. nigrita would appear to be common in the London district, but I know of no other habitat, although it is no doubt of wide distribution.

Continental distribution: Scandinavia, Germany, France, Italy.

2. Fenella Westwoodi, *sp. n.*

Black; knees, anterior tibiæ and tarsi sordid testaceous; wings smoky, the apex a little clearer. Antennæ ten-jointed, pilose, the third joint scarcely a half longer than the fourth which is a very little shorter than the fifth, two last joints subequal, the apical conical. Sutures on vertex deep, curved, the central portion of vertex behind the ocelli raised and separated from them by a suture. The transverse radial nervure is received a piece beyond the second cubital nervure, and in the third cubital cellule; the transverse median nervure is received beyond the middle of the cellule.

Length 1¾ line.

Differs from *nigrita* in being larger, in having longer antennæ, in having the wings much darker, in the transverse radial nervure being received at a greater distance from the second transverse cubital, in the transverse median nervure being received beyond the middle of the cellule and in the darker legs. *F. monilicornis*, Thoms., agrees with it in coloration, but it has fourteen-jointed antennæ, and the transverse radial nervure is interstitial. It is very like *Fenusa melanopoda* in the coloration of the body, legs and wings, and in the neuration of the latter, but it is a little larger, has the antennæ a little longer and ten-jointed, while the third joint is not double the length of the fourth. It, in fact, forms a connecting link to *Fenusa*.

Rare. Bishopton, on Birch.

Genus—FENUSA.

Fenusa, Leach, Z. M., iii, 126.

Antennæ nine to ten-jointed, short, thick, more rarely longish, third joint longer than fourth.

Wings with two radial and three cubital cellules, the first and second of the latter receiving each a recurrent nervure. Basal nervure curved as is the first recurrent; lanceolate cellule petiolate; posterior wings with no middle cellules; accessory nervures longly appendiculated.

Body short, thick. Feet without patellæ.

The head has usually the sutures on the vertex distinct. The vertex behind the ocelli raised and bounded by a furrow in front. The clypeus is truncated at the apex. The eyes reach to the base of the mandibles. The palpi are, I consider, six-jointed but between the third and fourth joints is a short constriction which Hartig regards as the representative of a joint. The basal joint is not much longer than the second which is scarcely half the length of the third; the last three do not differ much in length.

The labial palpi are short; the first is scarcely shorter than the third; the second is nearly three times longer than the third; the last is nearly as long as the preceding three. The mandibles are short, thick, the apical tooth distinct, and there is a blunt subapical one.

The larvæ are similar in form and habits to those of *Phyllotoma*, only no cocoon is spun in the mine.

The body colour is black; the legs are also usually black, relieved with white, or they may be testaceous entirely. The wings are never hyaline; they being more or less smoky. The stigma is large and projects a little from the costa; it is usually fuscous.

This is a genus of small extent; the three cubital cellules place it alongside *Phyllotoma* and *Fenella*, with which the species agree in the form and habits of the larvæ; but undoubtedly it has strong affinity with one section of *Blennocampa* as already pointed out (p. 230). The difference in the number of joints in the antennæ readily distinguishes it from *Phyllotoma* and *Heptamelus;* but it is not so easily distinguished from *Fenella;* in fact, the only distinction seems to be that *Fenella* has more than nine joints in the antennæ (the number in *Fenusa* being nine).

The genus is confined to the Palæarctic and Nearctic regions. Eight European and two North American species have been described.

Obs.—The genus *Kaliosyphinga*, Tischbein (S. E. Z., vii, p. 79, 1846), is no doubt identical with *Fenusa*. In most of the species of *Fenusa*, but especially with *pumila* and *melanopoda* (with either of which the description of *K. Dohrnii*, so far as it goes, agrees), there is at the base of the lanceolate cellule an upturned nervure or spurious nervure (for it is much fainter than the regular nervures), which is joined or nearly joined to the anal nervure, thus giving the appearance of their being a contracted lanceolate cellule, which is the only distinction (the possession of a contracted in opposition to the petiolate lanceolate cellule of *Fenusa*) between *Kaliosyphinga* and *Fenusa*.

The Genus *Messa*, Leach (Z. M., iii, 126), is said to be founded on *Fenusa hortulana*, but in error, for *Messa* is stated to have one radial and four cubital cellules. It was probably founded on a small *Nematus*. Stephens' type is a *Blennocampa*.

Synopsis of Species.

1 (4) **Tegulæ white, legs for the greater part white.**
2 (3) **Pronotum and pleuræ black.** ***Pygmæa.***
3 (2) **Pronotum and pleuræ white.** ***Hortulana.***
4 (1) **Tegulæ black.**
5 (8) **Legs testaceous, antennæ longish.**
6 (7) **Transverse radial nervure received in middle of second cubital cellule; frontal sutures invisible.** ***Pumilio.***
7 (6) **Transverse radial nervure nearly interstitial; frontal sutures deep.** ***Betulæ.***
8 (9) **Legs white, antennæ longish.** ***Albipes.***
9 (8) **Legs for the greater part black. Antennæ short.**
10 (13) **Transverse radial nervure received beyond second transverse cubital in third cubital cellule.**
11 (12) **Antennæ not thickened towards the apex, third joint more than double the length of fourth.** ***Melanopoda.***
12 (11) **Antennæ perceptibly thickened towards the apex; third joint not more than double the length of fourth.** ***Pumila.***
13 (10) **Transverse radial nervure received before the apex of the second cubital cellule, nearly touching the second transverse cubital.** ***Ulmi.***

SECTION 1.—*Frontal sutures distinct. Transverse basal nervure touching costal. Transverse radial nervure received in the third cubital cellule or nearly joined to the third cubital. Legs mostly for the greater part black, seldom testaceous. Antennæ mostly short.*

1. FENUSA MELANOPODA.

Pl. II, figs. 6 and 6 *a*, Larva.

***Fenusa nigricans*, Thoms., Hym. Sc., i, 184, 1.**
***Phænusa melanopoda*, Cam., P. N. H. S. Glas., iii, 6; Fauna, 22, 1; André, Species, i, 231; Cat., 28,* 10.**

Glossy-black; antennæ shortly pilose, a little curved, as long, if not longer, than the thorax; the first joint large, globose, with a pedicle at the base; the second nearly as long as the first, not so globose; third more than double the length of the fourth; the rest to the eighth getting a little shorter; ninth conical, thinner and longer than the eighth. Head scarcely narrower than the thorax, smooth, covered with a fuscous-black pubescence; sutures distinct, moderately deep; labrum and mandibles piceous; palpi fuscous. Thorax shining, smooth, scarcely pubescent; sutures very distinct; cenchri obscure. Breast smooth, shining. Legs: all the knees, and four anterior tibiæ and tarsi

obscure yellowish-white, verging into testaceous; tarsi slightly darker; spurs short. Abdomen short, apex truncated obliquely; sheaths of saw glabrous, a little projecting; blotch broad. Wings blackish, with deep black costa, stigma and nervures; costa dilated towards the stigma; first radial cellule much broader and longer than the second; first cubital longer than the second, which is twice wider at the apex than at the base, and angled where it receives the second recurrent nervure. Transverse radial nervure curved, received a good piece past the second transverse cubital; first recurrent received in the middle of the first cubital cellule; the second about a fourth of the length of the cellule from the first transverse cubital nervure.

Length 1¾ line.

The larva mines the leaves of the common alder. The head is black, as are also the legs for the greater part. Above, on the second segment, is a broad, black plate, divided in the middle. Below, on the same segment, is a large black plate, which is small and truncated at the base, but spreads and curls out at the apex, retreating again in the middle, the sides being curved; on the third and fourth segment is a small, black, round dot. At the last moult the markings are cast off. The larvæ are found from July to September, or even October, there being apparently two broods in the year. Common and generally distributed.

Continental distribution: Sweden, Germany, France.

Obs.—Thomson adopts the name of *Nigricans*, Klug, for this species, but the description of the latter is very ambiguous: "Brownish-black; antennæ as long as the abdomen; labrum and tips of mandibles testaceous; legs pale testaceous, with dusky trochanters; wing scales yellowish; wings hyaline, with nervures and stigma brownish." Length 2 lines. Hab. Sweden (Hartig, Blattw., 259). Thomson himself thinks that the *nigricans*, Klug, may have been a *Blennocampa* with only three cubital cellules, but we have no evidence of this, so I believe it best to re-name the present species.

2. FENUSA PUMILA.

Tenthredo pumila, Klug, Berl. Mag., viii, 120, 190; Htg., Blattw., 259, 3.
— *pygmæa*, Zett., I. L., 340, 11.
Fenusa pumila, Ste., Ill., vii, 41; Thoms., Opus., 272, 2; Hym. Sc., i, 186, 2; Cam., P. N. H. S. Glas., iii, 8, 2; Fauna, 22, 2; André, Species, i, 231, pl. xiv, fig. 10; Cat., 28,* 9.

Fenusa fuliginosa, Healy, Ent., iii, 225.
Aphadnurus tantellus, Costa, Fauna di Napoli, 41, pl. lxvi, fig. 6.

Black, shining; knees, tibiæ and tarsi pale testaceous. Antennæ short, slightly thickened towards the apex; the third joint not more than double the length of the fourth.

The ♂ similar, but with thicker antennæ, sometimes paler on the under side than above, and with the hinder tibiæ suffused with black.

Length 1¼ line.

Smaller than the preceding; the head scarcely so pilose, the wings of a lighter tint; posterior tibiæ rarely black, tarsi paler; antennæ shorter, thickened towards the apex, the third joint not more than double the length of the fourth; the joints more globose, not so sharply cut off from one another; and the frontal sutures scarcely so deep.

The larva, when young, has the body white, with a greenish tinge on the back, caused by the food shining through the food canal; the head pale brown. On the ventral surface of the second segment is a black dumb-bell shaped mark, and in the centre of the third and fourth is a round black dot. The feet are encircled with black; the abdominal ones entirely white. Before the third moult the head is darker coloured; on the dorsal surface of the second segment is an oblong, black mark, usually divided in two by a pale line in the centre. On the ventral surface of the second segment is an irregular black plate; and on the third, fourth, fifth and sixth there is, in the centre, a black dot, these dots being, however, frequently absent from the two last mentioned segments. At the last moult the body loses the markings, and becomes of a yellowish-white colour, with a pale brown head. Length about 5 lines.

It lives on the leaves of the birch, preferring, as Mr. Healy has remarked, a variety with woolly leaves. There are usually from four to ten in a single leaf, each mine being at first separate, but in course of time they become united. There are two broods; the first in June and July, the second in August to October. The pupa state is passed in the earth without the protection of a cocoon. The pupa is white.

Common in birch woods in May and June, and again in the autumn.

Continental distribution: Sweden, Germany, France, Italy, Russia.

3. FENUSA ULMI.

Fenusa ulmi, Sundeval, Forhandl. red de Skand. Naturforsk., Christiania, 1847, 240, 241; Healy, Ent., v, 297; Kalt., Pfl., 539; Cam., P. N. H. S. Glas., iii, 9, 3; Fauna, 22, 3; André, Species, i, 230; Cat., 28,* 8.

— *intermedia*, Thoms., Hym. Sc., i, 186, 3.

Black, shining. Antennæ short, stout, covered with a stiff pile; two first joints together equal in length to the third, which is twice longer than the fourth, the remaining joints to the eighth shorter, the ninth joint conical, longer than the preceding. Head a little narrower than the thorax, scarcely pubescent, shining, smooth, sutures moderately distinct; labrum and mandibles piceous; palpi dark testaceous. Thorax shining, smooth, glabrous; tegulæ black. Abdomen short, conical, thick, smooth, semi-truncated at the apex; blotch large, sheaths of saw exserted. Legs: femora, coxæ and trochanters black; apical half of the two anterior femora, knees, tibiæ and tarsi, dark testaceous. Wings faintly smoky; first radial cellule a little smaller than the second, second cubital cellule more than double the width of the base at the apex, angled where it receives the recurrent nervure.

♂ similar, but with thicker and longer antennæ, the joints from the fourth being perceptibly thicker than the basal ones.

Length 1¼ line.

Ab. Four posterior tibiæ and tarsi black.

Ulmi is not unlike the two preceding species, but has the frontal sutures less distinct, the wings a good deal clearer, and otherwise is easily separated by the position of the transverse radial nervure which almost touches the second transverse cubital.

The larva is white, with the head pale brown, darker at the sides; mouth reddish-brown; legs encircled with brown. Beneath, on the second segment, is a black oblong plate, sometimes with a dot on either side; there is a small, black, central dot on each of the following segments, but the dots are often absent on the posterior segments. When full fed it is yellowish-white. Length 5 lines.

It mines the leaves of *Ulmus montana* and *U. campestris*, several larvæ living on the same leaf. Mr. Healy says there is but one brood in England, namely, in May and June; but as I have captured the flies in August there is probably an autumnal as well as a spring brood.

Brischke (Schr. ges. König., xi, 71) records *Perilissus pictilis*, Holmgr., as a parasite.

Common in England and Scotland.

Continental distribution: Sweden, Germany, France, Russia.

4. FENUSA HORTULANA.

Tenthredo hortulana, Klug, Berl. Mag., viii, 187; Htg., Blattw., 258, 1.
Fenusa hortulana, Cam., Proc. N. H. S. Glasg., iii, 96; André, Species, i, 231; Cat., 27,* 1; Fletcher, E. M. M., xviii, 127.

Antennæ a little longer than the head and thorax, black above, pale testaceous beneath; the joints distinctly separated, slightly projecting at the apices beneath; pilose; the third joint more than double the length of the fourth. Head smooth, shining, covered with a short pile; the sutures distinct; antennal fovea large but shallow; apex of clypeus semi-truncated; labrum large, rounded at the apex; labrum and clypeus white; mandibles brownish at the tips; eyes lead coloured; thorax, tegulæ, pronotum and pleuræ broadly whitish-testaceous; the pronotum whiter than the sides of the breast; sternum and the lower fourth of the sides black. Abdomen short and broad; the ventral segments a little whitish at their junction; sheath of saw projecting, hairy and curved. Legs whitish-testaceous; the base of coxæ black. Wings almost hyaline; costa and stigma fuscous; second cubital cellule not much longer than first, and a very little longer than third, but much narrower at the apex than the third; transverse radial nervure nearly interstitial; second recurrent received a little in front of the middle of the second cubital cellule. The cenchri are obscure; the blotch is very small.

Length 1¼ line.

The larva has been found by Mr. J. E. Fletcher to blotch the leaves of *Populus nigra* in July.

Seemingly a rare insect. South of England, Worcester.

Continental distribution: Germany, France (?).

SECTION 2.—*Frontal sutures indistinct. Transverse basal nervure not touching costal. Legs for the greater part white or testaceous. Transverse radial nervure received usually before the third transverse cubital. Antennæ longish.*

5. FENUSA PYGMÆA.

Tenthredo pygmæa, Klug, Berl. Mag., viii, 121; Zett., I. L., 340, 11, ♂; Htg., Blattw., 259, 4.
Fenusa pygmæa, Ste., Ill., vii, 41, 3; Thoms., Opus., 272, 3; Hym. Sc., i, 186, 4; Cam., P. N. H. S. Glas., iii, 10, 4; Fauna, 22, 4; André, Species, i, 229; Cat., 27,* 5.

Black; antennæ nearly as long as the abdomen; the two first joints large, the third scarcely double the length of the fourth, the rest gradually, but slightly, decreasing in length; covered with a stiff microscopic down. Head very smooth, shining, with a faint scattered down; tegulæ white; face covered with a sparse scattered pubescence; frontal sutures invisible; eyes greenish. Abdomen a little longer than the head and thorax; apex rounded; saw largely exserted. Legs: coxæ, trochanters and the greater part of the femora black; knees, tibiæ and tarsi clear white. Wings half smoky, clearer at the apex; first radial cellule a little shorter than the second; first cubital cellule shorter than second, which is double the width at the apex that it is at the base, and angled where it receives the recurrent nervure. Radial nervure received about a fourth of the length of the second cellule in front of the second transverse cubital nervure.

The ♂ is unknown to me.

Length 1½ line.

Pygmæa closely resembles *albipes*, but differs from it in the black femora, white tegulæ, shorter antennæ, and longer second cubital cellule. From *hortulana*, with which it agrees in the white tegulæ, it is easily separated by the black pleuræ, longer antennæ, and black femora.

Larva white. Head light brown, darker at the sides; eye spots black; mouth reddish-brown. On the second ventral segment is a large black plate occupying the whole segment, except a small portion at the edges and apex; on the third there is, across the centre, a large black band, and on the fourth there is a small, somewhat spindle-shaped, black band. The back of the second segment is black, except at the edges; sometimes this black portion is divided down the centre by a faint white line. Length about 4 lines.

It blotches the leaves of the oak in the autumn, one, two, or three living in a single leaf.

Gryptocentrus incisulus, Ruthe, is recorded by Brischke as its parasite.

Apparently not common. Occurs in the London district and Norwich; in Scotland it has been taken in Clydesdale and at New Galloway.

Continental distribution: Sweden, Germany.

6. FENUSA ALBIPES.

Plate XIII, figs. 7, 7 *a*, ♀.

Phœnusa albipes, Cam., E. M. M., xii, 131 (1875); P. N. H. S. Glas., iii, 11, 5; André, Species, i, 232; Cat., 27,* 2.
Fenusa albipes, Cam., Fauna, 22, 5.

Black, shining, covered sparsely with a very short pile, only visible in certain lights. Antennæ a little longer than the body, slightly pilose; the third joint longer than the fourth. Legs entirely white; posterior tarsi and tips of anterior faintly fuscous. Wings smoky; costa, nervures and stigma black; transverse radial nervure received a little past the middle of the second cubital cellule. Sheath largely exserted. ♀.

Length 1¼ line.

Very rare. Taken in Cadder Wilderness on 20th August on a rose bush.

7. FENUSA PUMILIO.

Fenusa pumilio, Htg., Blattw., 259, 5; Thoms., Hym. Sc., i, 187, 5; Cam., Fauna, 22, 6.
— *rubi*, Boie, S. E. Z., 1848, 340.
— *pumila*, Waeles, Zool. (1856), 5074; West., Ent. Ann. (1862), 129; Healy, Ent., v, 211, 212.
Phœnusa pumilio, Cam., P. N. H. S. Glas., iii, 11, 6; André, Species, i, 231, pl. xiv, fig. 3; Cat., 27,* 7.

Black, shining, scarcely pubescent. Antennæ longer than the abdomen, moderately thick, pale fuscous beneath and covered with a short pile. Head narrower than the thorax, very smooth, shining, glabrous; labrum piceous, palpi testaceous. Thorax smooth, shining, covered with a microscopic pile; tegulæ black. Abdomen about the length of the head and thorax; apex more or less truncated, sheath hairy; blotch very large. Legs whitish-testaceous; base of coxæ black; apex of coxæ, trochanters and basal half of femora more or less obscured with black or fuscous; apex of tarsi fuscous. Wings smoky, hyaline at the apex; nervures deep black, stigma large; first radial cellule triangular, smaller than the second; transverse radial nervure received a little past the middle of the second cubital cellule; first cubital cellule nearly double the length of second, and having near its apex a conspicuous, round, black horny point; second not much longer than broad, angled where the recurrent nervure is received.

The ♂ is similar in coloration; the antennæ are a good deal thicker and slightly compressed, the third joint scarcely longer than the fourth (in the ♀ it is perceptibly longer), and the femora have usually more black on them.

Length 1¾ line.

Differs from *betulæ* in its shorter antennæ, perfectly smooth head, the smoky wings hyaline at the apex and in the position of the transverse radial nervure. From the descriptions of Hartig and Thomson it seems to vary considerably in coloration. The former author describes it as having the mouth, antennæ, abdomen and legs dark brown, with the knees, tibiæ and tarsi pale brownish-yellow, while Thomson states that the antennæ are fuscous beneath, and the palpi, knees, tibiæ and tarsi, whitish-testaceous. A British specimen in my collection has a brownish splash across the mesonotum.

Common and generally distributed.

The larva is dirty white; the head pale brown, darker at the sides; mouth dark brown; eye spots black; the thoracic legs are banded with brown, the abdominal marked posteriorly with a semicircular black mark, and the anal pair are surrounded with black. On the back the second segment is black or brownish-black, and sometimes on the third and fourth there is a narrow band; beneath the second segment is dark brown; there is an irregular band on the third and fourth, and on the fifth and sixth a round dot, but these are frequently absent. At the last moult the markings are cast off. Length from 9 to 10 lines.

The larvæ mine the leaves of *Rubus fructicosus* and *R. idæus*, to the latter of which they often do such great injury that the bushes do not produce a proper supply of fruit for two or three years. The first brood occurs in July and August, a second is met with from September to the end of October. Zaddach mentions that they mine the leaves of *Geum urbanum*, and Kaltenbach (Pfl., 512) that " the larva lives in the green, hard, projecting leaf-galls on *Salix aurita*," where it passes the winter, emerging as a fly in July. This last observation is no doubt erroneous.

Continental distribution: Sweden, Germany, France, Italy, Russia.

8. FENUSA BETULÆ.

Fenusa betulæ, Zaddach, Beschr., 29; Cam., P. N. H. S. Glas., iii, 13; Fauna, 23, 7; André, Species, i, 232; Cat, 27*, 3.
Phyllotoma mellita, Newman, Healy, Ent., v, 1—7.

Black, shining; covered with a fuscous pile, especially on the head and thorax. Antennæ longer than the head and thorax; the joints thicker at the apex than at the base, distinctly separated from one another; the first with a conspicuous petiole at the base, and truncated at the apex; third longer than the fourth; the rest shorter; the ninth conical, thinner, and longer than eighth. Head scarcely narrower than the thorax; face densely covered with a fuscous pubescence; sutures in the vertex distinct; frontal foveæ large and moderately deep; the central round, the lateral longer and thinner; labrum testaceous; palpi fuscous. Thorax black, shining; tegulæ testaceous. Abdomen shining, as long as the head and thorax, covered with a fuscous pile, which is shorter than that on the head and thorax; apex truncate; the blotch invisible, saw projecting, sheath very hairy. Wings faintly fulvous-coloured, if anything clearer at the apex; first radial cellule longer than the second; transverse radial nervure nearly if not quite interstitial; second cubital cellule not much shorter than the first, the sides above straight, not curved, in length not much longer than broad; at the lower end of the first cubital cellule is a small black dot. Legs yellowish-testaceous, coxæ, trochanters, and base of femora black; hinder tarsi fuscous. ♀.

Length 2 lines.

Larva white; head pale brown, darker at the sides, mouth reddish-brown; eye spots black. The second segment above bears a shield-like black plate; beneath there is a large black plate on the same segment, and on each of the third fourth, fifth and sixth is a small dot; along the sides are a number of black dots; a large one on the second, three on the third, and four on the others, the last being smaller than those in front. The thoracic legs are banded with black; the abdominal have above a small black band; and the anal two are broadly marked with the same colour. The penultimate segment sometimes bears in the centre two small black dots. The number of dots varies a good deal, they are often absent from the fifth, sixth, and penultimate, and along the sides some individuals have more and others less than usual. When full-fed the markings are cast off.

The pupa is yellowish-white.

The larvæ live gregariously—often to the number of seven or eight in a single leaf—in the leaves of the birch, appearing first in June and again in the autumn.

Brischke (Schr. ges. Konig., xi, 71) records as parasites *Perilissus macrophygus*, Holm., *P. sulcatus*, Holm., and *P. verticalis*, Brischke.

Common from Sutherlandshire to the south of England.

Continental distribution: Germany, France.

Genus—HEPTAMELUS.

Melicerta, Steph., Ill., vii, 94 (?).
Heptamelus, Haliday, Nat. Hist. Rev., 1855, 60.
Cœnoneura, Thoms., Opusc. Ent., 270.

Antennæ seven to eight-jointed, densely pilose, somewhat thickened towards the apex, second joint not transverse, double the length of first; third a half longer than fourth; last longer than preceding, conical at apex.

Wings with two radial and three or four cubital cellules, of which the second and third receive each a recurrent nervure. Lanceolate cellule with an oblique cross nervure. Posterior wings with two middle cellules.

The transverse basal nervure is curved and is received a good piece before the cubital, and is nearly joined to the transverse median, which again is joined to the oblique nervure in lanceolate cellule. The first transverse cubital nervure is represented by a mere stump at either end; the second cubital cellule is a little longer than the fourth; the third is smaller than either, is narrow at the base, wider and angled where the transverse radial and second recurrent nervures are received, namely, a little before the middle of the cellule, and nearly opposite each other; the apex is wider than the base, but is not dilated. In the transverse radial and in the two transverse cubital nervures, is a bulla which occupies the greater part of the nervures; there is a small one at apex of first recurrent, and which extends to more than half of the third cubital cellule along the cubital nervure, and a larger one is on the second recurrent. The accessory nervure in hind wings is longly appendiculated. The recurrent and transverse cubital nervures are received close to each other, almost united.

The sutures on the vertex are deep, but do not reach to the back of the head. The ocelli form a triangle and the lower one is situated in a deep depression. Below each of the antennæ is a deep, but not very large fovea. The clypeus is small and shortly incised. The palpi are long, the labial four and the maxillary six-jointed. The first joint of the latter is small, the second much longer, and a little longer than the third, which is about the same length as the fourth; the fifth is shorter than the fourth; the sixth is nearly as long as the second. The mandibles are short, thick, the apical joint acute, and there is a short, sharply projecting subapical tooth, which is clearly separated on either end. The sutures on the mesonotum (including that in centre of middle lobe) are deep; the scutellum is widest in the middle, the base being more angled and narrower than the apex; the sutures bounding it are deep and wide. The legs have the calcaria of moderate length; the claws are almost bifid; the metatarsus is as long as the succeeding joints together; the tarsi are a little longer than the tibiæ; the patellæ are absent. The sheath of the saw largely projects.

The larva is unknown.

This is a very distinct genus, easily distinguished from every other. Its affinities appear to me to be with the *Phyllotomides* on the one hand and *Athalia* on the other, although it is very distinct from both.

It is only known from Europe.

HEPTAMELUS OCHROLEUCUS.

Pl. XIII, figs. 8, ♀, 8 *a*, Antenna; Pl. XVIII, fig. 9, Saw.

Melicerta ochroleucus, Ste., Ill., vii, 94 (?).
Heptamelus ochroleucus, Haliday, Nat. Hist. Rev., 1855, ii, 60, pl. ii, fig. 1.
Cœnoneura Dahlbomi, Thoms., Opus., 271, 1; Hym. Sc., i, 182; Cam., E. M. M., xi, 108, ♂; Fauna, 22; André, Species, i, 238 (pl. xv, fig. 1 ?); Cat., 29,* 1.

Black or fuscous black; head, thorax, antennæ and costa covered with long pale hairs; the two basal joints of antennæ testaceous legs pale testaceous, the apex of posterior tibiæ and tarsi fuscous. Wings hyaline; costa testaceous; stigma fuscous-black, pale at the base; tegulæ white. ♀.

Ab. ♀. Antennæ black, a small spot on mesonotum and sternum dull reddish; the middle of abdomen above the lower part of the sides and belly dull reddish.

♂. Mouth pale; two basal joints of antennæ pale testaceous, the rest fuscous. Pro- and mesonotum, the metapleuræ and sternum reddish; abdomen pale testaceous with black or fuscous-black transverse bands above, metanotum and base of abdomen black. Wings with nervures, costa and stigma reddish-yellow.

Length 2¼—2¾ lines.

The two varieties of the ♀ are about equally common, but the first does not appear to have eight-jointed antennæ as it has in Sweden; the eighth joint, however, is somewhat longer and more sharply pointed, the point being constricted giving the appearance of two joints. The quantity of red on the thorax and abdomen of the second variety varies, as do the black abdominal bands on the ♂.

Common in two or three places in Clydesdale. North Yorkshire (Marshall). County Down, Blarney

(Cork), Kerry (Haliday). It seems to be attached to birch, and appears in June, July and August.

Sweden is the only Continental country from which it has been recorded.

Genus—ATHALIA.

Athalia, Leach, Z. M., iii, 126.

Wings with two radial and four cubital cellules, all angled where the recurrent or transverse nervures are received. Basal nervure jointed to cubital; transverse median received not far from base of cellule. Lanceolate cellule with an oblique cross nervure. Posterior wings with two middle cellules; the recurrent and transverse cubital nervures received close to each other; accessory nervure longly appendiculated; costa and stigma thick; there is no costal cellule owing to the thickness of the nervures.

Antennæ short, distinctly thickened from the fifth joint to the apex, almost clavate, ten to eleven-jointed, the third joint double the length of fourth.

Head without sutures; eyes large, oblong, converging; clypeus truncated at the apex; labrum large, somewhat triangular. Mandibles large, with a subapical tooth.

The body is short, broad, the wings large, broad. The feet are stout, with simple claws, and spines which are not one-third of the length of the metatarsus. The tarsi longer than the tibiæ, and with the patellæ of moderate size. The abdomen is not much, if longer than the head and thorax; the blotch is distinct.

The ground colour is luteous, with the head, antennæ and thorax more or less black; usually the tibiæ have the apices of the joints black. The wings have a yellowish tinge, or are hyaline; the stigma and costa are black.

The larvæ are cylindrical, thick compared to their length, bare or ornamented with tubercles. The ground colour is black or slate, sometimes marked with white dots; the skin is more or less wrinkled. A single cocoon is spun in the earth. Their food plants are *Cruciferæ*, *Scrophulariæ*, and possibly *Clematis*.

This genus is apparently confined to the old world, where it has a very wide range, not only occurring all over the Palæarctic region, but also in the Oriental and Ethiopian as far south as the Cape. Two of the species have also an extensive distribution, namely, *A. spinarum*, which is found almost everywhere in Europe, in Japan and India, and *A. rosæ*, which extends south to the west coast of Africa.

It is a most distinct and natural genus, not readily confounded with any other, and having, it may be, however, only superficial resemblances to widely different groups. The antennæ, for instance, resemble those of *Allantus*, except that they have more than nine joints. In coloration it mimics some of the *Hylotomæ*, *e.g.* *H. rosæ*. In the position of the basal nervure, in the shortness of the spurs, and in the form and habits of the larvæ it agrees with the *Selandriades*, while the number of joints in the antennæ would seem to ally it to the *Phyllotomides*, and the angled cubital cellules and general arrangement of the nervures agree best with *Heptamelus*. From the paucity of species and their wide distribution, as well as from their want of very nearly related forms, it would seem as if the genus was a very old one.

Synopsis of Species.

1 (2) Mesonotum smooth, shining, glabrous, breast, pleuræ and underside of the antennæ luteous. *Ancilla.*
2 (1) Mesonotum densely pubescent.
3 (10) Abdomen entirely luteous, clypeus small, mouth white.
4 (9) Tarsi annulated with black.
5 (6) Middle lobe of mesonotum and underside of thorax luteous. *Spinarum.*
6 (5) Middle lobe of mesonotum black.
7 (8) Scutellum luteous in ♀; sternum luteous, tarsal joints luteous at the base; third joint of antennæ more than double the length of fourth. *Scutellariæ.*
8 (7) Scutellum black in ♀; sternum black, base of tarsal joints white; third joint of antennæ not more than double the length of fourth. *Rosæ.*
9 (4) Tibiæ partly and tarsi entirely black. *Lugens.*
10 (2) Abdomen with the basal segment black, clypeus broad, luteous. *Annulata.*

1. ATHALIA ANCILLA.

Athalia ancilla, Lep., Mon., 22, 63; Ste., Ill., vii, 43, 5.
— *glabricollis*, Thoms., Opus., 268, 5 (1870); Hym. Scand., i, 171, 1; Cam., Proc. N. H. S. Glas., iii, 129; Fauna, 16, 1; André, Species, i, 285; Cat., 36,* 6.
— *rosæ*, Cam., Sc. Nat., ii, 197—199 (lar.).
Phyllotoma annulata, Fall., Mon., 28, 3.
Tenthredo liberta, Klug, Germar's Reise nach Dalmatien, 257, 333.

Smooth, shining, glabrous, reddish-luteous. Head, antennæ, meso- and metanotum, the apex of posterior tibiæ and the tarsal joints at the apex (the four anterior slightly), with the apex of sheath, black. Mouth and palpi white; the antennæ from the second joint are pale testaceous on the underside. Wings hyaline, yellowish at the base; the nervures and costa at the base are yellowish, for the rest black; stigma black; tegulæ luteous; blotch large, clear white. ♀ and ♂.

Length 3½—4 lines.

Larva. Head small, partly retracted into the second segment, deep shining black and covered with a short pile. Legs black; the abdominal ones with the tips white and the anal (which are small) entirely so. The upper part of the body is lead coloured; below the spiracles it is pale white. The skin is much wrinkled and folded, and beset with small tubercles. At the last moult the mouth is whitish, and the body becomes of a pale slate colour. Length 6 to 7 lines.

The pupa is pale white.

The larva is of the same habits as its better known congener *Spinarum*, and affects like it cruciferous plants, *Erysimum*, *Sisymbrium*, &c., and, as will be seen from the description, does not differ materially from it. I have met with full-fed larvæ at the end of July, and from some collected then have reared the perfect insects at the beginning of September, but others belonging to the same batch did not change till the following spring. Having only once found the larvæ I cannot say whether they are double brooded or not, nor if they are injurious to turnips.

Glabricollis is not an uncommon insect (commoner, I should say, than *spinarum*) in June. I have taken it in Clydesdale, Dumfriesshire, Rannoch and Sutherlandshire; have seen specimens from Berwickshire, Aberdeen, and in England it has occurred in the London district, Glanvilles' Wootton, Norwich, Gloucester, Worcester and Manchester.

On the Continent it has been recorded from Sweden, Lapland, France and Dalmatia, and no doubt it is very generally distributed over the north and northwest. I have seen a good many German specimens.

2. ATHALIA SPINARUM.

Plate XIV, fig. 2, ♀ ; Plate III, fig. 11, Lar.

Tenthredo spinarum, Fab., S. E., ii, 110, 20; Klug, Berl. Mag., viii, 127, 1; Zett., I. L., 339, 3.
— *centifoliæ*, Pz., F. G., 49, 18.
— *colibri*, Chr. B., 434, pl. 50, fig. 1.
Hylotoma spinarum, Fab., S. P., 26, 21.
Phyllotoma spinarum, Fall., Mon. Tenth., 27, 1.
Athalia spinarum, Leach, Z. M., 111, 126; Dbm., Prod., 62, 9; Clavis, 16 (lar.); Yarrell, Proc. Z. S., ii, 67; Ste., Ill., vii, 42, 1; Curtis, B. E., 617 (details); Farm., Ins., 37, pl. B (lar., &c.); West., Int., ii, 102; Evers., Bull. Mosc., xx, 34, 1; Voll., Tidj. Ent., 109, 111, pl. 9 (im., lar., &c.); Zool. S. S., 9067; Tasch., Ent. Gärt., 150, 63, figs. 36 and 37 (im. and lar.); Newport Prize Essay; Fraunf. Verh. z. b. Ges., 1866, 839; Thoms., Hym. Scand., i, 173, 2; Kalt., Pfl., 32, 36, 41; André, Species, i, 287, pl. xvii, figs. 2, 4 and 5; Cat., 36,* 5.
— *spinarum*, var. *Orientalis*, Cam., Tr. Ent. Soc., 1877, 90.
— *centifoliæ*, Lep., Mon., 24, 71; Ste., Ill., vii, 42, 2.

Luteous, covered above with a dense whitish pubescence. Antennæ, head (except the mouth, which is white and covered with a whitish pubescence), the mesonotum at the sides, metanotum, apex of tibiæ and the joints of the tarsi at the apex, black. In front of the mesonotum the black colour forms a triangle, the base being in front, and there is a faint luteous spot in the centre of the metanotum. The scutellum is luteous. Sheath of saw black at the apex and very hairy. Wings hyaline, with a fuscous tinge at the apex and yellowish at the base; nervures (except at the base, where they are yellowish), costa and stigma deep black, the latter is luteous at the extreme base; tegulæ luteous; palpi pale testaceous; the upper edge of the pleuræ below the wings is black; the mandibles piceous; the blotch is large, pale yellow.

The ♂ has the two basal joints of the antennæ entirely, and the other joints beneath, pale luteous; the face below and surrounding the antennæ and the inner edge of the eyes white.

In the ♀ the antennæ are often pale luteous or brownish on the underside.

Length 3—4 lines.

Readily known from the other species of the group by the yellow markings on the mesonotum.

The eggs are oval, whitish and semitransparent. They are laid along the leaf margin on the underside embedded in the epidermis. About 250 to 300 are deposited by a single ♀. According to Newport sometimes only one egg may be laid on a leaf, but not unfrequently as many as eight, ten, fifteen, or even twenty, according to Curtis; when a number is deposited on the same leaf they are arranged along the margin at irregular intervals. The same excellent observer says that when only a few eggs are laid on the leaf they are generally placed on the leaflet at the base of the leaf and seldom at the apex. The fly does not deposit her eggs indifferently on all the leaves of the plant, but usually on the second set, "or four leaves after the cotyledonous leaves," and never on the cotyledonous leaves themselves. Neither are they laid on the inner or youngest leaves, which have their surfaces rougher than the outer ones.

According to most observers the eggs are invariably laid in the hottest part of the day and when the sun is shining.

When first laid the egg is scarcely visible, there being no trace of it apparent beyond a slight elevation of the cuticle, and this is often so slight that it is only by extracting the egg itself that its presence becomes apparent. Within twenty-four hours the elevation has increased while the egg has become more opaque. By the second day it has still further increased, and the depression in which the egg is situated widens so that a free space equal to its own width surrounds it on both sides. This continues to expand and the egg becomes still more opaque, and the future larva is seen curled up in a semicircular form inside. On the fifth day it escapes.

This is about its normal rate of progress if the weather be warm, but if, on the other hand, it be wet and cold, the development is retarded considerably, taking six, seven, or even twelve days, according to the temperature. If the weather be very unfavorable many of them are destroyed.

When developed, the larva eats its way through the shell, and then through the part of the leaf which encircles the eggs. It eats at first the upper epidermis, the portions eaten out being noticeable as little brown patches, which are "partial perforation of the leaf covered with the round cuticle of the upper surface." When it quits the egg it is about half a line long, and of a whitish colour with a black head. According to Newport it does not eat the egg shell which remains in the cavity. In three days it is double its original length. At this period, according to the same author, if it has to descend to the ground to search for a more suitable leaf or for any other reason, it aids its descent by means of a silken thread which it attaches to the leaf and drops down by its aid. When older it does not possess this faculty. It moults for the first time on the fifth day after leaving the egg. In all it moults three times, each at an interval of from five to seven days before it becomes fully fed and is ready to form its cocoon.

After leaving the egg the larva is white with two black dots on the head; but soon the body becomes darker and the head quite black. When the larva is about fully grown the head is narrower than the second segment, shining black, and covered with a few short hairs. Each of the body segments is divided into several folds, and smooth and shining, without any hairs. The upper part to the spiracles is black, on each side is a longitudinal slate-coloured spot; then a row of black, mostly double oblong spots. The legs are slate-coloured; the abdominal legs are black splashed with grey; they are almost hid by the overhanging folds of the body.

The pupa is greyish-white.

The cocoon is oval and is formed of grains of earth closely agglutinated together. Externally it is rough; internally smooth and shining.

The larva eats night and day, and seems to delight in the hottest sunshine, in which it basks curled up on the upper surface of the leaf. It lives as a larva about nineteen days.

There are usually three broods in the year; the first appears in early summer, the second at the end of July and beginning of August; these become developed at the middle of September, and give issue to another brood which feed on sometimes to the end of October.

Although the larva is principally known from the ravages it commits on the turnip, yet it also feeds on other cruciferous plants such as *Sinapis arvensis*, *Barbarea* and *Sisymbrium*. Indeed, *Sinapis* is probably the natural food plant, and according to Newport it prefers it even to the white turnip. The last-mentioned author has found them on *Sinapis* in great abundance, feeding upon the leaves and flowers. Newport says also, that if there be any charlock in the same field with the turnip, the larva will attack the former plant first; and if there be plenty of the weed they will stick to it and leave the turnips alone.

The flies make their appearance in May, then in July, August and September with the second and third broods. According to Curtis they live from twelve to fourteen days. They fly in the sunshine and frequent flowers, showing a preference for roses, according to some authorities. Hence the species was named *Centifoliæ* by Panzer. When touched or alarmed they tuck the antennæ and legs close to the body and drop to the earth, where they remain motionless until the danger has passed away. During cloudy weather they remain seated on the underside of the leaves, frequently four or five being seen on the same leaf. Curtis says that they are preyed upon by swallows.

Newport remarks that the flies proceed in flights across the fields or district in which they may be located. Thus, he once noticed them very busily ovipositing in a field. On the second day there were scarcely any left on that part of the field where they were first observed; they were then at work in the middle. By the third day they had proceeded still further, and on the fourth they had reached the opposite end of the field from which they started. It is suggested by Newport that the whole of the eggs are not laid in one day, but may take three or four—a very likely supposition considering that each female lays about two hundred and fifty.

The larva of this *Athalia* is known to farmers by the name of the "black palmer," "black canker," "black slug," or "nigger." The first published account of its ravages in Britain is contained in a paper by W. Marshall in the 'Transactions of the Royal Society' for 1783. According to this writer the larva had committed very great ravages in the year before that, and he mentions also that it had been equally injurious in 1760. Yarrell says that it was abundant again in 1818, while from 1833 and onwards it did very great damage.

There seems to be some reason for believing that the insect may have originally come over from the Continent, for Marshall says that they first made their appearance on the eastern coast; they were observed to alight in clouds and were found afterwards heaped up on the shore in some places to a depth of two inches. They abound during warm and dry summers; cold and wet ones checking their spread very effectively.

Various remedies have been recommended for checking the ravages of the larvæ. Spreading quicklime and the refuse of gas works has been used, and in some cases, with benefit, especially if before they are applied the turnips be dragged over by a rope so that the larvæ may fall to the earth. It has also been found very beneficial to turn a flock of ducks into the fields; these birds eat the larvæ readily and have in some cases saved the crops; but, on the other hand, feeding on the larvæ tends to injure the ducks, as they suffer much from diarrhœa and become very emaciated. It has been suggested by Newport that if when the flies have appeared and are about to lay their eggs, the turnips be well watered daily or twice daily with sea water, or with water mixed with salt, this will tend to destroy the eggs.

The larvæ are preyed upon by a thread-worm, *Mermis albicans*, a Dipteron, *Meigenia bisignata*, and by the Hymenoptera, *Bassus athaliaeperda*, Curtis, *Tryphon succinctus*, Gr.; *Tryphon marginellus*, Gr.; *Perilissus lutescens*, Holmg. (*teste* Brischke); *Mesoleius armillatorius*, Gr.; *M. ciliatus*, Holmg.; *Tryphon brachyacanthus*, Gr. (Ann. Soc. Ent. Fr., 1878); *Perilampus splendidus*, *P. violaceus*.

The species appears to be generally distributed over England, being, however, apparently rare in the north. It does not seem to have been very injurious of late years, a fact no doubt owing to the system of rotation of crops. In Scotland it has not, so far as I can learn, been ever very injurious. Mr. James Hardy tells us that a black *Athalia* larva was once rather destructive in Berwickshire, but it was got rid of by an application of quick lime. It is more than possible that damage attributed to *Spinarum* may in reality have been caused by the very similar larva of *A. glabricollis*.

Spinarum is found all over the Palæarctic region, extending eastward into Japan. The Japanese specimens have the black on the thorax broadly divided in the middle. In India a form occurs differing from the European variety in having the costa at the base, the basal joints of the antennæ and the epistoma luteous; the thorax is black only behind the scutellum; there is also a yellowish mark on the metanotum and the wings are not yellowish = var. *Orientalis*, Cam.

3. ATHALIA SCUTELLARIÆ.

Plate III, fig. 9, Larva.

Athalia scutellariæ, Cam., E. M. M., xvii, 66 (1880); André, Species, i, 581 (Suppl.).

Luteous, pilose; the head (except the apex of clypeus and the labrum, which are white), meso- and metanotum (except the apex of middle lobe of mesonotum and the greater part of the scutellum, which are luteous) and the upper half (in some cases only the third) of pleura, black. Legs luteous, the apices of the four posterior tibiæ and the joints of all the tarsi broadly annulated with black. Antennæ black, eleven-jointed, testaceous on the under side. Wings hyaline, nervures, costa (save at extreme base, where they are testaceous) and stigma black. ♂ similar, but with the mesonotum entirely black.

Length 2—2¼ lines.

Allied to *A. rosæ*, but distinguished by its smaller size, more pilose body, luteous sternum and scutellum in the ♀, by the third cubital cellule being shorter in proportion to the second and at the same time wider at the base, by the third joint of the antennæ being more than double the length of the fourth, which is not the case with *rosæ*, while the tarsal joints at the base are of the same colour as the rest of the legs, and not whitish as in the commoner species.

The larva is of a deep velvety black colour. On the sides at the top are twelve white tubercles which are longer than broad; over the legs there is a row of larger and more oval tubercles of the same colour, while above these on the abdomen there is a row of smaller white tubercles situated above the space separating the larger ones below them, this middle row of tubercles being of the same shape as those on the top. The head is deep black and covered with a moderately long pile; the legs are fuscous-black, the abdominal ones white or dirty-white. The skin is rough and of a velvety texture.

The larvæ feed on *Scutellariæ galericulata* in the buds of *Clematis erecta*, and deposits her eggs therein. In course of time the larvæ cause a bladder-like swelling, wherein the brown-headed creatures live until they are about half fed, a period extending from fourteen to twenty days; after this they become external feeders, become of a brownish-green colour, and devour the leaves for fourteen to twenty days more, when, reaching maturity, they drop to the earth, where they pass the winter.

If these observations refer to *lugens*, it is certain that it must have some other food plant besides *Clematis*, since the saw-fly is found in districts where the plant is not native, nor occurs at all. The matter stands in need of re-investigation.

Lugens is a not uncommon species in Britain. It has been found in Clydesdale, the midland counties, Worcester, Gloucester, Glanvilles' Wootton, Devonshire and the London districts.

Continental distribution: Sweden, Germany, Holland, France.

6. ATHALIA ANNULATA.

Tenthredo annulata, Fab., S. E., ii, 110, 22; Klug, Berl. Mag., viii, 89, 4; Htg., Blattw., 285, 4.

Athalia annulata, Ste., Ill., vii, 44, 8; Dbm., Prod., 66, 12, pl. 2, fig. 44 (lar.); Lep., Mon., 24, 70; Thoms., Opus., 267, 4; Hym., Scand., i, 174, 4; Cam., P. N. H. S. Glas., 111, 131; Evers., Bull. Mosc., xx, 34, 3; Kalt., Pfl., 471; André, Species, i, 286; Cat., 36,* 7.

Hylotoma annulata, Fab., S. P., 23, 26.

Reddish-luteous. Thorax covered with a dense silky pubescence; scutellum almost glabrous; the antennæ, meso- and metathorax, the upper part of the first abdominal segment, sheath, the base of coxæ, apex of posterior tibiæ and tarsi, more or less black; mouth pale red. Wings hyaline, the basal half yellowish; costa luteous at the base, the rest with the stigma and the nervures at the apex black. ♀ and ♂.

Length 3—3½ lines.

This species differs from all the others in the reddish colour of the mouth. Some of the forms of *rosæ* resemble it, but the above peculiarity, the black first abdominal segment, the coxæ black at the base, with the almost black posterior tarsi, readily separate the two. Most of the English specimens that I have seen have the base of the posterior tarsal joints luteous, the middle joints are blackish at the tips from the second joint, and the anterior faintly fuscous at the apex. According to some of the describers the posterior tarsi are entirely black, but I have never seen a specimen with them entirely of one colour. I have seen some Continental specimens with scarcely any black, the apical joints being only faintly fuscous.

Kaltenbach relates (l. c.) that he found the larva of *annulata* in July, and again in September and October on *Veronica beccabunga*, the leaves of which it eats on the underside. He describes the larva as being dull black, whitish at the sides, and as spinning a cocoon in the earth. A larva answering to this description I have found myself on *Veronica* in Clydesdale, but unfortunately did not succeed in rearing it.

Dahlbom, on the other hand, says that he received from Drewsen its larva, which according to him fed on the turnip. It is stated to have been of a glaucous colour and beset with distinct tubercles, which are well shown in Dahlbom's figure which was taken from a specimen preserved in spirit.

Annulata is the rarest of the British species of *Athalia*. I have seen a specimen from Worcester and a few from Glanvilles' Wootton. The perfect insect is stated by Kaltenbach to frequent in summer the flowers of *Heracleum*.

It has a wide European distribution, being found in Sweden, Germany, Holland, France, Hungary and Russia.

EXPLANATION OF ABBREVIATIONS.

ABBREVIATIONS USED IN THE REFERENCES TO SERIALS AND TRANSACTIONS OF SOCIETIES.

Am. Nat.—The American Naturalist (Salem).

Ann. Ent. Belg.—Annales de la Société Entomologique de Belgique (Brussels).

Ann. Mus. H. N.—Annales du Musée d'Histoire Naturelle (20 vols., Paris, 1802-13).

Ann. N. H.—Annals and Magazine of Natural History (London).

Ann. Sci. Nat.—Annales des Sciences Naturelles (Paris).

Ann. Soc. Ent. Fr.—Annales de la Société Entomologique de France (Paris, 1832, *et seq*).

Arch. f. Nat.—Archiv für Naturgeschichte (Berlin).

Arch. Ver. Mecklenb.—Archiv des Vereins der Freunde der Naturgeschichte in Mecklenburg.

Berl. Mag.—Magazin der Gesselschaft naturforschender Freunde zu Berlin (Berlin, 1807, *et seq*).

B. E. Z.—Berliner Entomologische Zeitschrift (Berlin, 1857, *et seq*).

Bull. Ent. Ital.—Bullettino della Società Entomologica Italiana (Florence).

Bull. Mosc.—Bulletin de la Société Impériale des Naturalistes de Moscow, 1847, *et seq*.

Bull. Soc. Ent. Fr.—Bulletin des Séances de la Société Entomologique de France (Paris).

C. R. Ent. Belg.—Comptes rendus des Séances de la Société Entomologique de Belgique (Brussels).

C. B. Ver. Regensb.—Correspondenz-Blatt des Zoologisch-mineralogischen Vereins in Regensburg (Ratisbon).

C. B. Ver. Rheinl.—Correspondenz-Blatt des Naturhistorischen Vereins der preussischen Rheinlande und Westphalens (Bonn).

Canad. Ent.—The Canadian Entomologist (Montreal).

E. M. M.—The Entomologist's Monthly Magazine (London, 1864, *et seq*).

Enc. Méth.—Encyclopédie Methodique (10 vols., Paris, 1789—1825).

Ent.—The Entomologist (London).

Ent. Ann.—The Entomologist's Annual (London, 1856—1874).

Ent. Mag—The Entomological Magazine (5 vols., London, 1833—38).

Ent. Nachr.—Entomologische Nachrichten (Katter; Putbus, 1876, *et seq*).

Ent. Tidskr.—Entomologisk Tidskrift pö fõran Staltande af Entomologiska Föreningen i Stockholm (Stockholm).

Deutsche E. Z.—Deutsche Entomologische Zeitschrift (Berlin).

Feuill. Nat.—Feuilles des jeunes Naturalistes (Mülhausen).

Germ. Zeit.—Germar's Zeitschrift für die Entomologie (5 vols., Leipzig, 1839—44).

Guér. Mag. Zool.—Guérin-Méneville's Revue et Magasin de Zoologie, d'Anatomie comparée et de Palæontologie (Paris, 1831, *et seq*).

J. B. Ver. Zwickan.—Jahresbericht des Vereins für Naturkunde zu Zwickan.

J. B. Zool. Sect. Westf. Ver.—Jahresbericht der Zoologischen Section für das Etatjahr 1877—78 des westfälischen Provinzialvereins für Wissenschaft und Kunst.

Lin. Ent.—Linnæa Entomologica; published by the Entomological Society of Stettin (16 vols., Berlin and Leipsic, 1846-66).

Loud. Mag.—Loudon's Magazine of Natural History (9 vols., London, 1829—36).

M T Münch. Ent. Ver.—Mittheilungen des Münchener Entomologischen Vereins (Munich).

M T Schw. Ent. Ges.—Mittheilungen der Schweizerischen Entomologischen Gessellschaft (Schaffhausen).

Nat. Hist. Rev.—The Natural History Review; a Quarterly Journal of Science (Dublin and London).

Öfv.—Öfversigt af Kongliga Svenska Vetenskaps-Akademiens Förhandlingar (Stockholm, 1845, *et seq.*).

Proc. Amer. Ent. Soc.—The Proceedings of the American Entomological Society (Philadelphia).

Proc. Lin. Soc.—Journal of the Proceedings of the Linnean Society of London (1857, *et seq.*).

Proc. N. H. S. Glas.—Proceedings of the Natural History Society of Glasgow (1868, *et seq.*).

Rep. E. Soc. Ont.—Report of the Entomological Society of Ontario.

R. Z.—Revue et Magasin de Zoologie pure et appliquée (Paris).

S. B. z. b. Wien.—Sitzungsberichte der Zoologisch-botanischen Gesellschaft in Wien (Vienna).

S. E. Z.—Stettiner entomologische Zeitung (Stettin, 1840, *et seq.*).

Schr. ges. Danz.—Neueste Schriften der Naturforscher der Gesellschaft zu Danzig.

Schr. ges. König.—Schriften der K. physikalisch-ökonomischen Gesellschaft in Preussen (Königsberg).

Scot. Nat.—The Scottish Naturalist (Perth and Edinburgh).

Sv. A K. Handl.—Kongliga Svenska Vetenskaps Akademiens Handlingar (Stockholm, 1780, *et seq.*).

Term. füzetek.—Természetrajzi füzetek: az állat-növeny-ázvány-és földtan Köréböl (Peste).

Tr. Amer. Ent. Soc.—Transactions of the American Entomological Society (Philadelphia).

Tr. Ent. Soc.—The Transactions of the Entomological Society of London (1834, *et seq.*).

Tr. Lin. Soc.—The Transactions of the Linnean Society of London (1791, *et seq.*).

Verh. pr. Rheinl.—Verhandlungen des naturhistorischen Vereins der preussischen Rheinlande und Westphalens (Bonn, 1844, *et seq.*).

Verh. Wien z.-b. Ver., and *Verh. z.-b. Ges.*—Verhandlungen des zoologisch-botanischen Vereins in Wien; afterwards Kaiserlich-Königliche zoologische-botanische Gesellschaft (Vienna, 1852, *et seq.*).

Wiener Ent. Zeit.—The Wiener Entomologische Zeitung (Vienna).

Z. ges Naturw.—Zeitschrift für die gesammten Naturwissenschaften (Berlin).

Zool.—The Zoologist (London, 1843, *et seq.*).

Zool. Anz.—Zoologischer Anzeiger (Leipzig).

Z. wiss. Zool.—Zeitschrift für wissenschaftliche Zoologie (Leipzig).

ABBREVIATIONS OF AUTHORS' NAMES, SEPARATE WORKS, &c.

André, Spécies.—André (Ed.). Spécies des Hyménoptères d'Europe et d'Algérie (Beaune, 1879, *et seq.*).

Bouché, Naturg.—Bouché (P. F.). Naturgeschichte der Insecten, besonders in Hinsicht ihrer ersten Zustände als Larven und Puppen (Berlin, 1834).

Brischke, Abbild.—Brischke (C. G. A.). Abbildungen und Beschreibungen der Blattwespen Larven (Berlin, 1855).

Br. and Zad.—Brischke (C. G. A.) and Zaddach (G.). See Serials, *ante.*

Brullé, Exp. Mor.—Brullé (A.) (the Entomological portion of). Expédition scientifique de Morée (Paris, 1832).

Brullé, St. Farg. Hym.—Brullé (A.). St. Fargeau's Histoire Naturelle des Insectes; Hyménoptères (vol. iv, by Brullé, Paris, 1846).

Cam.—Cameron (Peter). See Serials, *ante.*

Cam., Fauna.—Cameron (Peter). The Fauna of Scotland, with special reference to Clydesdale and the Western District. Hymenoptera (Glasgow, 1876).

Cam., Cat.—Cameron (Peter). A Catalogue of the British Tenthredinidæ (Glasgow, 1876).

Christ, Hym.—Christ (J. L.). Naturgeschichte, Klassification und Nomenclatur der Insecten von Bienen, Wespen, und Ameisengeschlecht (Frankfort-on-Maine, 1971).

Costa, Fauna.—Costa (A.). Fauna di regno di Napoli (Naples, 1861).

Cur., B. E.—Curtis (John). British Entomology (16 vols., London, 1823-40).

Cur., Farm. Ins.—Curtis (John). Farm Insects; being the Natural History and Economy of the Insects Injurious to the Field Crops of Great Britain and Ireland (London, 1860).

Dalm., An. Ent.—Dalman (J. W.). Analecta Entomologica (Stockholm, 1823).

Dbm., Clavis.—Dahlbom (A. G.). Clavis Novi Hymenopterorum Systematis adjecta Synopsi Larvarum ejusdem ordinis Scandinavicarum Eruciformium (Lund, 1835).

Dbm., Consp.—Conspectus Tenthredinidum, Siricidum et Oryssinorum Scandinaviæ (Lund, 1835).

Dbm., Onych.—Dahlbom (A. G.). Onychia och Callaspidia, Tvenne för Skandinaviens Fauna Nya Insekt-Slägten, Nörande till Galläple-Steklarnes naturliga grupp (Lund, 1842).

Dbm., Prod.—Prodromus Hymenopterologiæ Scandinavicæ (Lund, 1836).

Dbm., Skand. Hym. F.—Skandinavisk Hymenopter-Fauna (Lund, 1846).

De Geer, Mém.—Degeer (C.). Mémoires pour servir à l'histoire des Insectes (Holm, 1752—78).

Don., B. I.—Donovan (E). The Natural History of British Insects (16 vols., London, 1792—1813).

Dours, Cat.—Dours (A.). Catalogue Synonymique des Hyménopètres de France (Amiens, 1873).

Ec.—Economy.

Evers.—Eversmann (Ed.). See Serials, *ante.*

Fab., E. S.—Fabricius (I. C.). Entomologica Systematica (4 vols., Copenhagen 1792—94; Supplement, 1798).

Fab., M. I.—Fabricius. Mantissa Insectorum (2 vols., Copenhagen, 1787).

Fab., S. E.—Fabricius. Systema Entomologiæ (Flensburg and Leipsic, 1775).

Fab., S. I.—Fabricius. Species Insectorum (2 vols., Hamburg and Kiel, 1781).

Fab., S. P.—Fabricius. Systema Piezatorum (Brunswick, 1804).

Fall., Mon.—Fallen (C. F.). Monographica Tenthredinetarum Sueciæ; (Lund, 1829).

Fallen, Specim. Hym.—Fallén (C. F.). Specimen novum Hymenoptera disponendi methodum exhibens (Lund, 1813).

Fonsc.—Fonscolombe (E. L. J. H. B. de, Baron). See Serials, *ante.*

Forst., Nov. Spp. Ins.—Forster (J. R.). Novæ species Insectorum, Centuria 1ª (London, 1781).

Först.—Förster (Arnold). See Serials, *ante.*

Fourc., *E. P.*—Fourcroy (A. F.). Entomologia Parisiensis (2 vols., Paris, 1785).

Frisch, *Beschr.*—Frisch (J. L.). Beschreibung von allerlei Insecten in Deutschland (Berlin, 1720—38).

Geof., *H. I.*—Geoffroy (E. L.). Histoire abregée des Insectes qui se trouvent aux environs de Paris (2 vols., Paris, 1762).

Gim.—Gimmerthal (B. A.). See Serials, *ante.*

Gir.—Giraud (J.). See Serials, *ante.*

Gmel., *S. N.*—Gmelin (I. F.). Caroli a Linné Systema Naturæ, ed. xiii (10 vols., Leipsic, 1788—93).

Hal.—Haliday (A. H.). See Serials, *ante.*

Harris, *Inj. Ins.*—Insects Injurious to Vegetation.

Htg.—Hartig (T.). See Serials, *ante.*

Htg., *Blattw.*—Hartig (T.). Die Familie der Blattwespen und Holzwespen nebst einer allgemeinen Einleitung zur Naturgeschichte der Hymenopteren (Berlin, 1837).

Illig., *Rossi*, *F. E.*—Illiger (I. C. W.). Fauna Etrusca, sistens Insecta quæ in provinciis Florentia et Pisana præsertim collegit P. Rossius, Iterum edita, et annotatis perpetuis aucta (2 vols., Helmstedt, 1807).

Im.—Imago.

Jurine, *Hym.*—Jurine (L.). Nouvelle Méthode de classer les Hyménoptères et les Diptères (Geneva and Paris, 1807).

Kalt., *Pfl.*—Kaltenbach (J. H.). Die Pflanzenfeinde aus der Klasse der Insecten (Stuttgart, 1874).

Karsch (*F.*)—See Serials, *ante.*

Kirby, *Fauna.*—Kirby (Wm.). Fauna Boreali Americana.

Kirby, *Int.*—Kirby (W.) and Spence (W.). An Introduction to Entomology (4 vols., London, ed. v, 1828).

Kirchner, *Cat.*—Kirchner (Herp.). Catalogus Hymenopterorum Europæ (Vienna, 1867).

Kl.—Klug (J. C. F.). See Serials, *ante.*

Kl., *Jahrb.*—Jahrbücher der Insecten Kunde (Berlin, 1834).

Kl., *Ent. Mon.*—Entomologische Monographien (Berlin, 1824).

Kl., *Sir.*—Monographia Siricum Germaniæ atque generum illis adnumeratorum (Berlin, 1803).

Lar.—Larva.

Latr., *Gen. Crust. et Ins.*—Latreille (P. A.). Genera Crustaceorum et Insectorum secundum ordinem naturalem in familias disposita (4 vols., Paris and Strasburg, 1806—9).

Latr., *N. H.*—Latreille (P. A.). Histoire Naturelle générale et particulière des Crustacés et des Insectes (14 vols., Paris, 1802—5).

Lep., *F. Fr.*—Id. Faune française ou histoire naturelle des animaux, qui se trouvent en France (Paris, 1823). An incomplete work.

Lep., *Mon.*—St. Fargeau (A. L. M. Le Peletier, Comte de). Monographia Tenthredinidarum, Synonimia extricata (Paris, 1823).

Lich., *Cyn.*—Lichtenstein (Jules). Les Cynipides, la génération alternante chez les Cynipides, par Dr. H. Adler de Schleswig, traduit et annoté par J. Lichtenstein, suivi de la classification des Cynipides d'après le Dr. G. Mayr de Vienne (Montpellier).

Lin., *F. S.*—Linné (C. von). Fauna Suecica, ed. ii (Stockholm, 1761).

Lin. S. N.—Linné (C. von). Systema Naturæ, ed. xii (Stockholm, 1766—68).

Malpighi, *Opera.*—Malpighi (M.) Opera omnia, Acc. Opera posthuma. 2 vols. (Lugd. B. 1687—1700).

Mayr, *Cynipiden-gallen.*—Mayr (G. L.). Die europäischen cynipiden-gallen mit Ausschluss der auf Eichen vorkommenden Arten (Wien, 1876).

Mayr, *Eichengallen.*—Mayr. (Gustav L.). Die mitteleuropäischen Eichengallen in Wort und Bild (Wien, 1871).

Mayr, *Genera.*—Die Genera der gallenbewohnenden Cynipiden (Wien, 1881).

Newport Prize Essay.—Newport (G.). Observations on the Anatomy, Habits, and Economy of *Athalia centifoliæ*, the Sawfly of the Turnip, and on the means which have been adopted for the prevention of its Ravages. The Prize Essay of the Entomological Society and Agricultural Association of Saffron Walden for the year 1837.

Nort., *Cat.*—Norton (E.), Catalogue of the described Tenthredinidæ and Uroceridæ of North America (separate pagination).

Panz., *F. G.*—Panze (G. W. F.). Faunæ Insectorum Germanicæ initia (109 pts., Nuremberg, 1792—1810).

Newm.—Newman (Ed.). See Serials, *ante.*

Newm., *Ent.*—Newman's Entomologist (London, 1840—42).

Ratzburg, *Forst. Ins.*—Ratzburg (J. T. C.). Die Forstinsecten, oder Abbildung und Beschreibung der in den Wäldern Preussens und den Nachbarstaaten als schädlich oder nützlich bekannt gewordenen Insecten. Dritter Theil. Die Ader. Zwei.—Halbnetz. und Geradflügler. (Berlin, 1844).

Réau., *Mém.*—Réaumur (R. A. F. de). Mémoires pour servir à l'Histoire des Insectes (7 vols., Paris, 1734—43).

Reinh.—Reinhard (H.). See Serials, *ante.*

Retz., *de Geer.*—Retzius (A. J.). Caroli de Geer genera et species Insectorum (Lipsiæ, 1783).

Roesul, *Ins. Belust.*—Roesul (A. J. von Rosenhof). Monatlich herausgegebene Insectenbelustigungen (Nuremberg, 1746).

Rossi, *F. E.*—Rossi (P.). Fauna Etrusca, sistens Insecta quæ in provinciis Florentina et Piscina præsertim collegit (Leghorn, 1790).

Rossi, *Mant.*—Rossi (P). Mantissa Insectorum, exhibens species nuper in Etruria collectas, adjectis Faunæ Etruscæ illustrationibus et emendationibus (Pisa, 1792—94).

Rudow (*F.*) —See Serials, *ante.*

Rudow Pfl.—Die Pflanzengallen Norddeutschlands und ihre Erzeuger (Neubrandenburg, 1875).

Siebold, *Beitr.*—Siebold (C. Th. E. von). Beiträge zur Parthenogenesis der Arthropoden (Leipzig, 1871).

Shuck., Burm. Man.—Shuckard (W. E.). Burmeister's Manual of Entomology, translated from the last German edition (London, 1836).

Schaeff., F. G.—Herrich-Schaeffer (G. A. W.). Fortsetzung von Panzer, Faunæ Insectorum Germaniæ initia (Regensburg, 1829—44).

Schenck (A.) Beiträge.—Beiträge zur Kenntniss der Nassauischen Cynipiden (Gallwespen) und ihrer Gallen, nebst einer Naturgeschichte der Gallen und Cynipiden im Allgemeinen (Wiesbaden, 1865).

Schlecht. Insecten.—D. H. R. von Schlechtendal und O. Wünsch. Die Insecten (Leipzig, 1879).

Schlechtendal (D. H. R.).—See Serials, *ante.*

Schr., En.—Schrank (F. von P.). Enumeratio insectorum Austriæ indigenarum (Ausberg, 1781).

Scop., Ent. Car.—Scopoli (J. A.). Entomologia Carniolica (Vienna, 1763).

Spin., Ins. Lig.—Spinola (Marquis M.). Insectorum Liguriæ species novæ aut rariores (2 vols., Genoa, 1806—8).

Ste., Ill.—Stephens (James Francis). Illustrations of British Entomology; Mandibulata (vol. vii, 1835, and Supplement, 1841).

S. v. Voll.—Vollenhoven (S. C. Snellen, van). See Serials, *ante.*

Tasch., Ent. Gärt.—Taschenberg Entomologie für Gärtner und Gartenfreunde (Leipzig, 1871).

Tasch., Hym.—Taschenberg (E. H.). Die Hymenopteren Deutschlands nach ihren Gattungen und theilweise nach ihren Arten (Leipzig, 1866).

Tasch., Naturg. wirb. Thiere.—Taschenberg (E. H.). Naturgeschichte der in Deutschland, Preussen und Posen den Culturpflanzen schädlichen wirbellosen Thiere (Leipzig, 1869).

Thoms., Hym. Sc.—Thomson (C. G.). Hymenoptera Scandinaviæ (Lund, 1871, *et seq.*).

Thoms.—Thomson (C. G.). See Serials, *ante.*

Thoms., Opusc. Ent.—Thomson (C. G.). Opuscula Entomologica (Lund, 1869, *et seq.*).

Tr.—Transverse.

Tschek.—Tschek (C.). See Serials, *ante.*

Walk.—Walker (F.). See Serials, *ante.*

Wachtl.—See Serials, *ante.*

West.—Westwood (John Obadiah). See Serials, *ante.*

West., Int.—Westwood (J. O.). An Introduction to the Modern Classification of Insects (2 vols, London, 1839—40).

Zad., Beschr.—Zaddach (Gustav.). Beschreibung neuer oder wenig bekannter Blattwespen aus dem Gebiete der Preussischen Fauna (Königsberg, 1859).

Zett., J. H.—Zetterstedt (J. W.). Insecta Lapponica descripta (Leipsic, 1840).

INDEX TO VOL. I.

Synonyms are printed in italics. Generic names in large type.

A.

Abdomen, 14
ABIA, larva of, 48
aenea, 36
fasciata, 36
Accessory nervure, 12
ALLANTUS, 139
agilis, 204
albicinctus, 129
arcuatus, 141, 149, pl. ix, figs. 4 *a* and 4 *b*, and fig. 5
ater, 88
aterrimus, 76
aucupariæ, 101
balteatus, 83
bicolor, 202
bifasciatus, 153
bipunctatus, 76
blandus, 127
cinctus, 91
cingulum, 141, 152
colon, 78
conspicuus, 82
costalis, 156
decipiens, 145
dispar, 86, 147
duodecempunctatus, 128
ferus, 128
flavicornis, 75
flavipes, 141, 147, pl. i, fig. 8
hæmatopus, 136
Koehleri, 153
lateralis, 100
laticinctus, 82
lividus, 76
mandibularis, 89
marginellus, 141, 145

ALLANTUS
marginellus, 145, pt. 147
melanotus, 149
neglectus, 128
nitida, 201
nothus, 149
pictus, 99
punctum, 138
punctulatus, 96
quadricinctus, 141, 144
ribis, 133
rufipes, 204
rufiventris, 82
rufocingulatus, 147
rusticus, 135
scalaris, 97
Schaefferi, 141, 151
scrophulariæ, 140, 141, pl. i, figs. 2 and 2 *a*
solitarius, 79
strigosa, 136
tenulus, 141, 153
tricinctus, 140, 143, pl. i, fig. 3; pl. ix, fig. 4
vespiformis, 143
viduus, 141, 154
viennensis, 145
viridis, 93
zonatus, 90
Anal appendages (male), 18
ANEUGMENUS, 264
coronatus, 264
Antennæ, 3
Aphadnurus
tantellus, 294
Asticta
Ianthe, 265

ATHALIA, 304
  abdominalis, 315
  ancilla, 305, 306
  annulata, 305, 316
  bicolor, 314
  Blanchardi, 314
  centifoliæ, 307
  cordata, 314
  glabricollis, 306
  Græslii, 35
  hæmatopus, 23
  lineolata, 314
  lugens, 305, 315
  scutellariæ, 305, 313, pl. iii, fig. 9
  spinarum, 305, 307, pl. xiv, fig. 2; pl. iii, fig. 11
  — var. orientalis, 313
  rosæ, 305, 314
  rosæ, Boisd., 227
  rosæ, Cam., 306
  Blasticotoma, 65

B.

BLENNOCAMPA, 229
  aethiops, 248
  albipennis, 243
  albipes, 231, 240, pl. ii, figs. 7 and 7 *a*
  alchemillæ, 231, 251, pl. xii, fig. 7
  assimilis, 231, 256
  betuleti, 231, 255
  bipunctata, 231, 242
  cinereipes, 231, 249
  croceiventris, 32, 247
  eppiphium, 231, 248, pl. xii, fig. 6
  feriata, 234
  fuliginosa, 231, 249
  fuscipennis, 231, 247
  geniculata, 231, 238, pl. vii, figs. 3, 3 *a*, 3 *b*
  inquilina, 245
  lineolata, 231, 241, pl. xii, fig. 5
  melanocephalus, 231, 245, pl. vii, fig. 4; pl. xii, figs. 8, ♀
  melanopygia, larva of, 36
  micans, 232, 237
  monticola, 234, 236
  nana, 231, 254
  nigripes, 231, 246
BLENNOCAMPA
  nigrita, 232, 235
  pubescens, 243
  pusilla, 231, 253, pl. iii, fig. 1
  ruficruris, 231, 244
  sericans, 232, 233
  spinolæ, 247
  subcana, 231, 252
  subserrata, 231, 250
  sulcata, 232, 236
  tiliæ, 256
  uncta, 251
Blotch, 15
Bullæ, 14

C.

CAMPONISCUS luridiventris, 39, Saw., pl. xvii, fig. 10
  — larva of, 50, pl. iv, fig. 2
Cellules, 11
CEPHIDÆ, 2
CEPHUS arundinis, 40
  pygmæa, 40
  xanthostoma, 35
Cerci, 15
CIMBICINA, 65
CIMBEX
  amerinæ, 37, 38
  axillaris, 39
  connata, 39
  femorata, 38
  humeralis, 34
Cenchri, 7
CLADIUS
  æneus, 38
  brullæi, 34
  — larva of, 50, pl. v, fig. 1
  difformis, 34, pl. xv, fig. 1 ♂, 2 ♀
  eradiatus, 35
  padi, 33, 34, 38, pl. xxi, fig. 9, Saw
  — larva of, 50, pl. v, figs. 4 and 6; pl. xv, fig. 5 ♀
  rufipes, 37
  viminalis, 37
  — larva of, 52, pl. v, fig. 2; pl. xv, fig. 3 ♂
Classification, 61
Cocoons, 55
Cœnoneura
  Dahlbomi, 303
Collecting and preserving, 59
Colour in sawflies, 19

CRŒSUS
latipes, 38
— larva of, 51
septentrionalis, 38
— larva of, 51, pl. iv, fig. 5
varus, parthenogenesis in, 25, 28, 51; lar., pl. iv, fig. 4
CRYPTOCAMPUS
angustus, 38
— galls of, 52
inquilinus, 37
pentandræ, 38
— galls of, 52
— injurious, 32
populi, 37
quadrum, 38
saliceti, 38
— galls of, 52

D.

Dimorphic larvæ, 54; mandible, pl. vi, fig. 12
DINEURA
despecta, 33
— larva of, 50
opaca, pl. xiv, fig. 4
rufa, 38
stilata, 34; lar., pl. iii, fig. 7 ♀; pl. xiv, fig. 5
testaceipes, 34; lar., pl. iv, fig. 1
verna, parthenogenesis in, 26
viridiorsata (Degeeri), 38, pl. xxi, fig. 7
Distribution, 59
DOLERUS, 157
abdominalis, 277
æneus, 161, 182, pl. xx, fig. 5
anthracinus, 160, 175, pl. xix, fig. 5
anticus, 160, 165
bajulus, 164
brevitarsis, 179
carbonarius, 175
cenchris, 176
Chappelli, 160, 166, pl. ix, fig. 8
cinctus, 269
cingulatus, 270
cœrulescens, 172
coracinus, 160, 174, pl. xix, fig. 4
dubius, 160, 167
eglanteriæ, 160, 164

DOLERUS
elongatus, 161, 182, pl. xx, fig. 7
femoratus, 170
ferrugatus, 165
fissus, 160, 176, pl. vi, fig. 3; pl. xviii, fig. 7
fulviventris, 160, 164, pl. ix, figs. 7 and 9
germanicus, 164
gessneri, 160, 168, pl. xix, fig. 3
gonagra, 160, 170, pl. ix, figs. 10 and 11
hæmatodis, 160, 172, pl. i, fig. 5
intermedius, 161, 180, pl. xx, figs. 1, 2
lateritius, 160, 163
leucobasis, 176
liogaster, 160, 171
lugubris, 162
madidus, 163
megapterus, 160, 177, pl. xix, fig. 7
micans, 172
niger, 161, 181, pl. xix, fig. 4
nitens, 174
oblongus, 160, 177, pl. xix, fig. 6
opacus, 172
palmatus, 159, 161
palustris, 160, 166
planatus, 176
possilensis, 161, 178, pl. xix, fig. 8
pratensis, 164
puncticollis, 160, 171
rufipes, 162
sanguinicollis, 160, 174
scoticus, 160, 169, pl. xix, fig. 1
togatus, 268
tinctipennis, 160, 169, pl. xix, fig. 2
trimaculatus, 162
triplicatus, 160, 162
tristis, 165
uliginosus, 166
varispinus, 161, 179, pl. xx, fig. 3
vestigialis, 159, 162
vicinus, 273
Dosytheus
anticus, 165
bajulus, 164
dubius, 167
eglanteriæ, 164
fulviventris, 164

Dosytheus
  hyalinis, 164
  junci, 166
  lateritius, 163
  madidus, 163
  triplicatus, 162
  xanthopus, 164
Druida
  parviceps, 284

E.

Eggs of sawflies, 30
EMPHYTUS, 266
  amaurus, 286
  apicalis, 276
  Bohemanni, 281
  calceatus, 267, 273, pl. ii, fig. 1
  carpini, 267, 278
  cerris, 39
  cerus, 277
  cinctus, 267, 269, pl. vi, fig. 4
  cingulatus, 267, 270
  cingulum, 272
  cistus, 277
  coxalis, 274
  didymus, 271
  filiformis, 267, 276
  gilvipes, 280
  grossulariæ, 267, 279
  Klugii, 276
  lepidus, 265
  melanarius, 267, 271
  melanopygus, 286
  microcephalus, 287
  neglectus, 270
  perla, 267, 281, pl. xi, fig. 9
  ochropodus, 285
  patellatus, 280
  rufocinctus, 267, 272
  serotinus, 267, 277, pl. iii, fig. 12
  succinctus, 268
  tener, 267, 280
  tibialis, 267, 275, pl. xiii, fig. 2
  togatus, 267, 268, pl. vii, fig. 2; pl. xi, fig. 8
  togatus, Kl., 270
  viennensis, 34
  Eniscia, 155
ERIOCAMPA, 219
  annulipes, 220, 222, pl. ii, fig. 4
ERIOCAMPA
  atratula, 227
  caninæ, 227
  cinxia, 220, 226
  crassicornis, 223
  dolosa, 229
  limacina, 220, 224, pl. ii, fig. 10
  livionensis, 227
  luteola, 208
  nitida, 227
  ovata, 220, 221, pl. xii, fig. 2; pl. xxi, fig. 6
  rosæ, 220, 227, pl. ii, fig. 5; pl. xii, fig. 3
  soror, 227
  testaceipes, 220, 228
  varipes, 220, 223
Ermelia, 200

F.

FENELLA, 288
  nigrita, 288
  tormentillæ, 289
  Westwoodi, 288, 289
FENUSA, 290
  albipes, 292, 298, pl. xiii, figs. 7, 7 *a*
  betulæ, 292, 300
  fuliginosa, 294
  hortulana, 292, 296
  Ianthe, 265
  intermedia, 295
  melanopoda, 292, pl. ii, figs. 6 and 6 *a*
  mellita, 300
  nigricans, 292, 293
  pumila, 292, 293
  pumila, 298
  pumilio, 292, 298
  pygmæa, 292, 297
  pygmæa, Healy, 289
  — Zett., 293
  rubi, 298
  ulmi, 292, 295

G.

Generic distinctions, 56

H.

Habits of larvæ, 32
  of sawflies, 22

HARPIPHORUS, 264
  lepidus, 265, pl. xiii, figs. 4, 4 *a*
  vernalis, 264
Head, 2
HEMICHROA
  alni, parthenogenesis in, 25; lar., pl. xxi, fig. 8
  rufa, parthenogenesis in, 28; lar., pl. iii, fig. 3 ♀; pl. xiv, fig. 8
HEPTAMELUS, 301
  Dahlbomi, 303
  ochroleucus, 303, pl. xiii, figs. 8, 8 *a*; pl. xviii, fig. 9
Heterarthrus, 282
  ochropodus, 285
HOLONOTA, 1
HOPLOCAMPA, 257
  alpina, 258, 262
  brevis, larva of, 49
  chrysorrhœa, 258, 263, pl. xiv, fig. 1
  cratægi, 258, 261
  cratægi, 262
  ferruginea, 258, 259
  fulvicornis, larva of, 49
  gallicola, 258, 260
  pectoralis, 258, 260, pl. xii, fig. 9
  plagiata, 262
  rutilicornis, 258, 263
  testudinea, 258
Hypopygial valves, 15
HYLOTOMINA, 65
HYLOTOMA
  amethistina, 34
  atrata, 38
  annulata, Fab., 316
  — Fall., 314
  berberidis, 33
  — larva of, 53
  ciliaris, 38
  cingulata, 188
  cœruleipennis, larva of, 53
  costalis, 156
  cyanella, 34
  eglanteriæ, 164
  enodis, 34
  — L., 38
  — larva of, 53
  eppiphium, 248
  ferruginea, 259
  fuscipes, 38
  melanocephalus, 245
  melanochroa, 38
HYLOTOMA
  pagana, 34
  pullata, 38
  rosæ, larva of, 53
  rosarum, 34
  serva, 194
  spinarum, 307
  ustulata, 38
  — larva of, 53
  vagans, 286

K.

Kaliosyphinga, 291
  Dohrnii, 291
Kessler on parthenogenesis, 26

L.

Labium, 5
Lanceolate cellule, 13
Legs, 8
LOPHYRINA, 65
LOPHYRUS
  elongatus, 39
  hercyniæ, 39
  injurious, 32
  larva of, 48
  nemorum, 40
  pallidus, 40
  pini, 40
  politus, 39
  polynotoma, 40
  rufus, 39
  similis, 40
  socius, 39
  variegatus, 39
  virens, 40
LYDINA, 65
LYDA
  campestris, 40
  depressa, 39
  — larva of, 53
  erythrocephala, 40
  — larva of, 53
  hypotrophica, 40
  inanita, larva of, 35, 53
  nemoralis, 33
  punctata, 34
  pyri, 33, 34
  — larva of, 53
  reticulata, 40
  stellata, 40
  — larva of, 53
  sylvatica, 37, 38
  — larva of, 53

M.

- MACROPHYA, 125
  - albicincta, 126, 129
  - *albicincta*, 133
  - albipuncta, 126, 131, pl. viii, fig. 12
  - blanda, 126, 127
    - — var. *brevicornis*, 127
  - carinthiaca, 133
  - crassula, 133
  - duodecempunctata, 126, 128
  - hæmatopus, 126, 135
  - punctum album, 126, 137, pl. viii, fig. 11
  - *punctum*, 138
  - quadrimaculata, 138
  - neglecta, 126, 128
  - ribis, 133
  - *ribis*, 126, 130
  - rufipes, 126, 136
  - rustica, 126, 134
  - *strigosa*, 136
  - sturmi, 126
- Male anal appendages, 18
- Mandibles, 4
- Maxilla, 4
- *Melicerta*
  - *ochroleucus*, 303
- *Melinia*
  - *minutissima*, 289
- *Messa*, 291
  - *hortulana*, 291
- Monoctenus, larva of, 48
  - — juniperi, 39
  - — obscuratus, 39
- *Monophadnus*, 229
  - *geniculatus*, 238
  - iridis, 40
- *Monostegia luteola*, 208

N.

- NEMATINA, 65
- NEMATUS
  - abbreviatus, 34
  - abdominalis, 39
    - — larva of, 50, pl. vi, fig. 9
  - abietum, 40
  - acuminatus, larva of, 38, 51
    - — scarcity of males, 25
  - albipennis, 37
  - ambiguus, 40
  - appendiculatus, 35
  - aquilegiæ, 33
- NEMATUS
  - aurantiacus, 37
  - baccarum, 38
    - — galls of, 52
  - bellus, 38
  - Bergmanni, 38
    - — larva of, 51
  - betulæ, 38
    - — larva of, 51
  - betularius, 38
  - bilineatus, 39
    - — larva of, 50
  - bipartitus, larva of, 52
  - cadderensis, larva of, 51, pl. iv, fig. 10
  - capreæ, larva of, 40, pl. iii, fig. 2
    - — var. of larva, 51, 54
  - carinatus, 40
  - cœruleocarpus, 37; lar., pl. vii, fig. 6
  - compressicornis, 37
  - compressus, 40
  - conductus, 40; lar., pl. iv, fig. 8
  - conjugatus, 37
    - — larva of, 51
  - consobrinus, 35
    - — larva of, 52, pl. vii, fig. 5
  - crassulus, larva of, 52
  - crassus, larva of, 51
  - croceus, 37
  - curtispina, 37
    - — larva of, 51, pl. vi, fig. 7
    - — parthenogenesis in, 26
  - dispar, 38
  - dorsatus, larva of, 38, 51, pl. iv, fig. 11
  - Erichsoni, 40
    - — males of, 26
  - fagi, 39
  - Fabrei, Dbm., 32
  - fallax, 38
    - — larva of, 51, pl. iv, fig. 9
    - — males of, 26
  - fraxini, 38
  - fulvipes, 38
    - — larva of, 51
  - fulvus, 37
    - — larva of, 51
  - fuscus, 37
  - gallicola, 52; lar. gall, pl. iii, fig. 8
    - — parthenogenesis in, 25, 27
  - glenelgensis, 38
  - glottianus, 38

NEMATUS
glutinosæ, 39
— larva of, 51, pl. vii, fig. 10
— parthenogenesis in, 27
herbaceæ, 38
— larva of, 52
ischnocerus, 38
— larva of, 52, pl. v, figs. 5 and 10
jugicola, 38
histrio, 38
— larva of, 51
imperfectus, *Zad.*, pl. xiv, fig. 9
insignis, 40
lacteus, 38
— larva of, 51, pl. vi, fig. 8
laricis, 40
leucostictus, 38; lar., pl. v, fig. 3
luteus, 39
— larva of, 50
maculiger, larva of, 51
melanocephalus, 37
— larva of, 51
melanoleucus, 38
miliaris, 38
— larva of, 51, pl. vi, fig. 10
— parthenogenesis in, 26
moestus, 33
myositidis, 33
myosotidis, larva of, 51
nigriceps, 40
nigrolineatus, larva of, 52, pl. vii, fig. 11
pallescens, 38
— larva of, 50
palliatus, 38; lar., pl. iv, fig. 13; pl. vi, fig. 6
— parthenogenesis in, 29
pallicercus, 37
pallidiventris, 26
pavidus, 37, 51
— parthenogenesis in, 29
poecilonotus, 38
posticus, 34
quercus, 36
— larva of, 51
— scarcity of males, 25
ribesii, larva of, 52, pl. vii, fig. 7
— parthenogenesis in, 26
ruficornis, larva of, 51
rumicis, larva of, 51
salicis, 37
— larva of, 51, pl. vii, fig. 9
— parthenogenesis in, 29

NEMATUS
salicivorus, 38; lar., pl. vii, fig. 8
Saxesenii, 40
scutellatus, 40
sulphureus, 37
tibialis, 33
togatus, 39
umbripennis, 37
vacciniellus, 36
— larva of, 52
validicornis, 37
vesicator, larva of, 52, pl. v, fig. 8
viminalis, 38
— larva of, 52, pl. v, figs. 7 and 9
xanthogaster, 38
xanthopus, 34
Zetterstedti, 37
Nervures, 10

O.

ORYSSIDÆ, 2
Ovipositor, 16

P.

PACYLOSTICA, 9
PACHYLOTA, 8
PACHYPROTASIS, 120
antennata, 121, 124, pl. ix, fig. 1
omega, 121, 123
rapæ, 121, 122, pl. ix, fig. 2; pl. vi, fig. 1
simulans, 121, 123
variegata, 121, 125
Parasites, 340
Parthenogenesis, 25
Patellæ, 8
Pectinia, 229
PERGA, 3
— Lewisii, 23
Perineura, 119
brevispina, 108
excisa, 111
gibbosa, 101
lateralis, 100
nassata, 117
ornata, 111
picta, 99
punctulata, 96
scalaris, 97

Perineura scutellaris, 103
  solitaria, 101
  sordida, 117, 118
  viridis, 97
Petioliventris, 2
PINICOLA, 8
— pusilla, 39
PINICOLINA, 65
PHYLLŒCUS
  compressus, 33
  cynosbati, 39
  fumipennis, 34
  phtisicus, 35
PHYLLOTOMA, 282
  aceris, 284, 285
  annulata, 306
  eppiphium, 248
  melanopyga, Kl., 286
  — Healy, 287
  microcephala, 284, 287, pl. ii, fig. 6; pl. iii, figs. 10, 10 *a*
  — Healy, 286
  nemorata, 284, pl. xiii, fig. 6; pl. iv, fig. 3
  ochropoda, 284, 285, pl. xiii, fig. 5
  rosæ, 314
  spinarum, 307
  tenella, 284
  tormentillæ, 289
  vagans, 284, 286, pl. vi, fig. 5
Phymatocera, 229
  aterrima, 232
PŒCILOSOMA, 206
  candidatum, 207, 210
  excisum, 208, 217
  Fletcheri, 207, 213, pl. xi, fig. 4
  guttatum, 207, 215
  impressum, 207
  longicorne, 208, 216
  luteolum, 207, 208, pl. iv, fig. 12, lar.
  nigricolle, 208, 218
  obtusa, 213
  pulveratum, 207, 211, pl. ii, fig. 2; pl. xx, fig. 8
  repanda, 210
  submuticum, 208, 216, pl. vii, fig. 1
POMPHOLYX, 9
Preserving, 59
Pupa, 55

S.

SCIOPTERYX, 155
  costalis, 156, pl. ix, fig. 6
  consobrinus, 156
  arctica, 156
Secondary sexual characters, 20
SELANDRIA, 193
  aethiops, 227
  adumbrata, 224
  albipes, 240
  analis, 194, 197
  annulipes, 222
  aperta, 194, 199, pl. xiii, fig. 9
  atra, 224
  betuleti, 255
  bipunctata, 210
  brevicornis, 235
  cereipes, 197
  cinereipes, 249
  cinxia, 226
  dorsalis, 194
  ferruginea, 259
  flavens, 194, 196
  flavescens, 196
  grandis, 195
  hyalina, 256
  interstitialis, 195
  lineolata, 241
  luteiventris, 247
  luteola, 208
  melanocephalus, 245
  Morio, 194, 198, pl. xiii, fig. 3
  ovata, 221
  pallida, 262
  phthisica, 192
  pusilla, 253
  Robinsoni, 232
  rosæ, 227
  ruficruris, 244
  serva, 193, 194, pl. xxi, fig. 1
  Sixii, 194, 195, pl. xxi, fig. 2; pl. ii, fig. 9; pl. xii, fig 1
  socia, 194
  soror, 227
  stramineipes, 194, 197
  temporalis, 194, 198
  testudinea, 258
  varipes, 223
SELANDRIADES, 183
Sessiliventris, 2
Siebold on parthenogenesis, 26
Sirex fuscicornis, 37
SIRICIDÆ, 2
Specific distinctions, 56

- Spiracles, 19
- STRONGYLOGASTER, 185
  - cingulatus, 186, 188, pl. xiv, fig. 7; pl. i, fig. 4
  - delicatulus, 187, 192, pl. xi, fig. 3; pl. i, fig. 7
  - femoralis, 187, 191, pl. xi, fig. 2
  - filicis, 186, 187
  - maculus, 186, 190
  - mixtus, 186, 190, pl. i, figs. 6, 6 *a*
  - multicinctus, Norton, 189
  - Sharpi, 186, 187
  - *viridis*, 192
- SYNÆREMA, 119
  - *delicatula*, 120
  - rubi, 120, pl. viii, fig. 10

T.

- Tarpa spissicornis, 35
- TAXONUS, 200
  - *agilis*, 204
  - agrorum, 201, pl. xi, fig. 6, 6 *a*
  - *bicolor*, 202
  - *coxalis*, 203
  - equiseti, 201, 202, pl. xi, fig. 7
  - Fletcheri, 201, 205
  - glabratus, 201, 204, pl. ii, fig. 3
    - — parthenogenesis in, 30
  - glottianus, 201, 206
  - *nitida*, 201
  - *pratorum*, 202
  - *sticticus*, 202
- TENTHREDINA, 65, 68
- TENTHREDO, 70
  - *abietinus*, 165
  - *adumbrata*, 224
  - *aethiops*, 228
  - *agilis*, 204
  - *agrorum*, 201
  - *albicincta*, 129
  - *albicornis*, 75
  - *albida*, 245
  - *albipes*, 197, 240
  - *albipuncta*, 132
  - *alpina*, 261
  - *ambigua*, 108
  - *analis*, 104
  - *annularis*, 76
  - *annulata*, 317
  - *anomala*, 201
  - *antennata*, 124
- TENTHREDO
  - arctica, 95
  - *arcuatus*, 150
  - *assimilis*, 256
  - *aterrima*, 232
  - atra, 73, 88, pl. xvi, fig. 3
  - *atra*, 86
  - *atricornis*, 188
  - *aucupariæ*, 101
  - balteata, 73, 83
  - *betuleti*, 255
  - bicincta, 73, 91
  - *bicolor*, 202
  - *bifasciata*, 153
  - *biguttata*, 77
  - *bipunctata*, 76, 242
  - *bizonata*, 202
  - *blanda*, Fab., 127
    - — Schaef., 128
  - caligator, 89
  - *caliginosa*, 106
  - *carbonaria*, 135
  - *carinata*, 187
  - *carpini*, 75
  - *centifoliæ*, 307
  - *cerasi*, 224
  - *chrysorrhœa*, 263
  - *cincta*, 90, 269
    - — Pz., 91
  - *cinereipes*, 249
  - *cingulata*, 188
  - *cinxia*, 226
  - *citreipes*, 136
  - *colibri*, 307
  - *collaris*, 172
  - colon, 78, pl. i, fig. 9
  - *conspicua*, 81
  - *coquebertii*, 104
  - *corallipes*, 136
  - *cordata*, 104
  - coryli, 77
  - *costalis*, 156
  - *coxalis*, 202
  - *crassa*, 170
  - *cratægi*, 261
  - *cylindrica*, 127
  - *delicatula*, Kl., 120
  - *delicatulus*, 192
  - *dimidiata*, 104
  - dispar, 73, 87, pl. xvi, fig. 1
  - *dispar*, 147
  - *diversipes*, 135
  - *dumetorum*, 136
  - *duodecimpunctata*, 128
  - *duplex*, 124

TENTHREDO
eborina, 192
eglanteriæ, 164
elegantula, 120
eppiphium, 248
equestris, 90
equiseti, 202
erythrogona, 170
erythropus, 138
fagi, 79
femoralis, 105
fera, 128, 129
ferruginea, 258
filicis, 187
flava, 74
flavens, 196
flaveola, 149
flavicornis, 35
flavicornis, 75
flavipes, 147
fuliginosa, 232
— Schr., 248
fulvenia, 156
fulviceps, 112
fulviventris, 164
fuscipennis, 247
fuscipes, 88
geniculata, 170, 238
germanica, 164
gibbosa, 74, 101
glabratus, 204
gonagra, 170
gossypina, 221
hebraica, 93
hæmatodis, 172
hæmatopus, 135
hyalina, 256
ignobilis, 107
instabilis, 104
— var. f, 108
— var. *nassata*, 117
interrupta, 93
juvenilis, 101
Lachlaniana, 73, 84, pl. viii, fig. 1
lacrymosa, 127
lateralis, 74, 100
latizona, 90
leucopus, 133
leucozona, 221
liberta, 306
ligustrina, 127
linearis, 188
lineolata, 241
livida, 73, 75

TENTHREDO
lividiventris, 120
longicornis, 238
luctuosa, 129
lugens, 315
luridiventris, 246
luteicornis, 75
luteiventris, 247
luteola, 208
macula, 190
maculata, 73, 90, pl. viii, fig. 2
mandibularis, 73, 89
marginata, 93
marginella, 145, 149
maura, 75
melanocephalus, 245
melanorrhœa, 117
mesomela, 73, 93
micans, 237
microcephala, 104
mixtus, 190
moniliata, 73, 85
morio, 198
nana, 254
nassata, 117
neglecta, 128
nemorata, 284
nigerrima, 235
nigra, 181
nigripes, 246
nigrita, 235
nitida, 201
notata, 135
notha, 149
obsoleta, 73, 94
ocreata, 135
olivacea, 73, 95
opaca, 172
orbitalis, 104
ornata, 111
pavida, 108
pedestris, 164
pellucida, 79
picta, 74, 99, pl. viii, fig. 7
plebeja, 85
pœcila, 85
pœcilochroa, 74
pratensis, 164
procera, 89
propinqua, 142
puella, 196
punctata, 97
punctulata, 74, 96
punctum, 138
pusilla, 253

TENTHREDO
quadricinctus, 144
rapæ, 122
ribis, 133
rosæ, 314
Rossii, 153
rubi, 120
rufipennis, 81
rufipes, 89
rufipes, 136, 204
rufiventris, 73, 81
rufocincta, 272
rustica, 134, 143
rutilicornis, 263
sareptana, 154
scalaris, Klug., 97
— Thoms., 93
Schaefferi, 128, 151
scotica, 73, 87, pl. xvi, fig. 2
scrophulariæ, 141
scutellaris, Fab., 108
— Lep., 108
seesana, 99
semicincta, 91
sericans, 233
serva, 194
simulans, 123
socia, 194
solitaria, 73, 79
— Fall., 101
sordida, 118
soror, 83
spinarum, 307
spreta, 111
sticticus, 202
stigma ?, 107
stramineipes, 197
strigosa, 136
succincta, 90
succinctus, 145
sulphurata, 135
tenera, 280
tenula, 153
testudinea, 258
tibialis, 275
tiliæ, 117
togata, Fab., 270
— Pz., 268
— Zett., 269
trabeata, 85, 92
trichocera, 249
tricinctus, 143
tristis, 111
vaga, 91
velox, pl. viii, fig. 6

TENTHREDO
vespiformis, 143
vidua, 154
viennensis, 145
viridis, 74, 97, pl. viii, fig. 4
viridis, 93
— Cam., 99
unifasciata, 90
xanthocera, 188
zonata, 90, 153
TENTHREDOPSIS, 102
albomaculata, 103, 113, pl. xvii, fig. 8
caliginosa, 103, 106, pl. xvi, fig. 7
cordata, 103, 104, pl. xvi, fig. 4; pl. viii, fig. 9
dorsata, 111
dorsivittata, 103, 115, pl. xviii, fig. 3
femoralis, 103, 105, pl. xvi, fig. 6
flavomaculata, 103, 110, pl. xvii, fig. 4
fulviceps, 103, 112
ignobilis, 103, 107, pl. xvii, fig. 1
inornata, 103, 116, pl. xviii, fig. 4
lividiventris, 103, 113, pl. xvii, fig. 7
microcephala, 103, 104, pl. xvi, fig. 5
microcephalus, 104
nassata, 103, 117, pl. xviii, fig. 5
nigriceps, 103, 114, pl. xviii, fig. 1
nigricollis, 103, 108, pl. xvii, fig. 2
nigronotata, 103, 106, pl. xvii, fig. 9
ornata, 103, 111
picticeps, 103, 110, pl. xvii, fig. 5
Saundersi, 103, 114, pl. xviii, fig. 2
scutellaris, 103, 108, pl. xvii, fig. 3
sordida, 103, 118, pl. xviii, fig. 6
tristis, 103, 111, pl. xvii, fig. 6
Thorax, 6
TRICHIOSOMA
betuleti, 34

TRICHIOSOMA
  fighting, 24
  lucorum, 24
  sorbi, 34
  vitellinæ, 38

W.

Wings, 9

X.

Xiphidria annulata, 39
  camelus, 39
  dromedarius, 37, 38

Z.

Zaræa, larva of, 48

INDEX TO PLANT NAMES.*

Acer campestre, 33, 285
  pseudo-platanus, 33
Achillea millefolium, 36
Ægopodium Podagraria, 35, 75
Agrimonia Eupatoria, 35, 289
Ajuga reptans, 315
Alchemilla alpina, 35, 252
  vulgaris, 35, 251
Alnus glutinosa, 39, 88, 99, 129, 212, 221
Amygdalus, 225, 287, 293
Anagallis arvensis, 209
Anthriscus sylvestris, 35
Aquilegia vulgaris, 33
Arundo Phragmites, 40
Barbarea, 310
Berberis vulgaris, 33
Betula alba, 38, 225, 255, 285, 293, 301
Brassica campestris, 33
Bupleurum falcatum, 35, 148
Cardamine pratensis, 33
Carex acuta, 40, 196
Cerasus, 225
Circæa lutetiana, 79
Circium lanceolatum, 36, 281
Clematis erecta, 32, 316
  Vitalba, 32
Comarum palustre, 34
Convallaria multiflora, 40, 233
Corylus Avellana, 39
Cotoneaster vulgaris, 34
Cratægus Oxyacantha, 34, 225
Equisetum, 165, 167
Erysimum, 306
Eucalyptus, 23
Euphorbia palustris, 37
Fagus sylvatica, 39
Festuca pratensis, 40, 171, 176, 182
Fragaria vesca, 35
Fraxinus excelsior, 36, 124, 138, 144, 235
Fuchsia, 79
Heracleum Sphondylium, 35, 93
Hypericum perforatum, 33
Geranium Robertianum, 33, 279
Geum urbanum, 35, 239, 300
Impatiens Noli-me-tangere, 33
Iris, 40
Jasminum, 36, 144
Juncus effusus, 40, 173, 196
Juniperus communis, 39
Laserpitium latifolium, 35
Ligustrum vulgare, 36, 138
Lonicera caprifolium, 35, 76, 144
  tatarica, 36
  Xylosteum, 35, 76
Lotus corniculatus, 33
Lysimachia vulgaris, 36, 209
Nepeta Glechoma, 36
Pastinaca sativa, 35
Pedicularis, 123
Petasites vulgaris, 36
Pinus Larix, 39
  sylvestris, 39

---

* The Index contains the names of a few plants not mentioned in the list at p. 32.

Plantago major, 37
media, 37
Poa aquatica, 40, 195
Polygonum Aviculare, 37
bistorta, 37, 204
Polystichum filix-mas, 40, 188, 192, 198
Populus dilatata, 37
nigra, 37, 396
tremula, 37, 286
Potentilla reptans, 35, 289
Prunus communis, 33
domestica, 33, 259
Pteris aquilina, 40, 83, 188
Pyrus communis, 34
Aucuparia, 34, 279
Quercus Cerris, 39
Robur, 39, 91, 222, 223, 242, 245, 265, 268, 276, 277, 298
Ranunculus acris, 33, 93, 240
bulbosus, 32
Ficaria, 32
repens, 33, 240
Raphanus sativus, 33
Ribes Grossularia, 35, 280
rubrum, 35, 199
Robinia Pseudo-acacia, 33
Rosa canina, 34, 210, 228, 253, 269, 270, 272, 273
Eglanteria, 34
Rubus cæsius, 239
fructicosus, 34, 299
Idæus, 23, 34, 273
Rumex acetosella, 37, 203
acutus, 37
Salix alba, 93
aurita, 97, 287, 300
Caprea, 37
fragilis, 37
limosa, 97
silesiaca, 97
vitellina, 37, 98
Sambucus nigra, 35, 130
racemosa, 35
Sarothamnus scoparius, 33
Scabiosa succisa, 36, 86
Scirpus palustris, 40, 173, 196
Scrophularia aquatica, 36, 123
nodosa, 36, 142
Scutellaria galericulata, 313
Senecio nemorensis, 36
Sinapis arvensis, 33, 310
alba, 33, 148
nigra, 33, 148
Sisymbrium officinale, 33, 306, 310
Solidago Virgaurea, 36
vulgaris, 36
Sorbus Aucuparia (see *Pyrus Aucuparia*).
Spiræa ulmaria, 35, 216, 217, 239, 274
Stachys Betonica, 123
erecta, 36
Symphoricarpus racemosa, 36
Syringa vulgaris, 36
Tilia europæa, 33, 222, 256
parvifolia, 33
Trifolium pratense, 33
repens, 33
Triticum vulgaris, 40
Ulmus campestris, 37, 296
montana, 37, 396
Urtica dioica, 37
Vaccinium Myrtillus, 36
Vitis-idæa, 36
Valeriana officinalis, 36
Verbascum nigrum, 36, 142
thapsus, 123
Veronica Beccabunga, 36
Chamædrys, 36
officinalis, 36, 93
Viola palustris, 33
Viburnum Opulus, 35, 144

INDEX TO NAMES OF PARASITES.

Bassus athaliaeperda, 312
Campoplex cerophagus, 272, 287
    transiens, 189
Chrysocharis albipes, 287
Cryptocentrus incisulus, 298
Cryptus emphytorum, 270
Cubocephalus fortipes, 189
Erromenus fumatus, 226
Euryproctus geniculosus, 196
Ichneumon Mussii, 189
Meigenia bisignata, 312
Mermis albicans, 312
Mesochorus politus, 246
Mesoleius armillatorius, 134, 246, 312
    ciliatus, 312
    formosus, 246
    luteifrons, 134
    niger, 189
Perilampus splendidus, 312
Perilampus violaceus, 312
Perilissus lutescens, 312
    macropygus, 246, 301
    pictilis, 296
    sulcatus, 301
    verticalis, 301
Plecticus tenthredinarum, 246
Pygostolus sticticus, 134
Tachina, 189
Trematopygus aprilinus, 246
    selandrivorus, 246
Tryphon brachyacanthus, 312
    eppiphium, 246
    excavatus, 226
    Gorski, 226
    lateralis, 246
    marginalis, 312
    Ratzburgi, 226
    succinctus, 312
    translucens, 226

PRINTED BY J. E. ADLARD, BARTHOLOMEW CLOSE.

PLATE I.

Fig. 1.—Larva of *Tenthredo mesomela.*

Fig. 2.—Larva of *Allantus scrophulariæ*; 2 *a*, id., last moult.

Fig. 3.—Larva of *Allantus* 3-*cinctus.*

Fig. 4.—Larva of *Strongylogaster cingulatus.*

Fig. 5.—Larva of *Dolerus hæmatodis.*

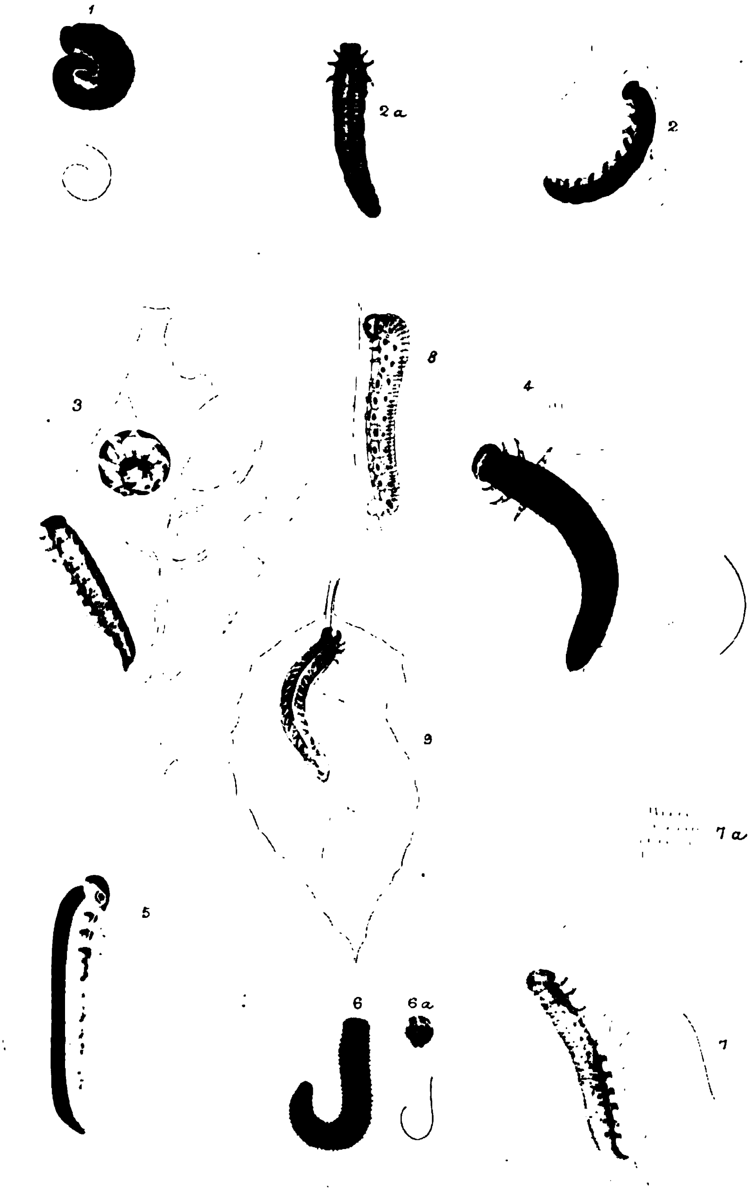
Fig. 6.—Larva of *Strongylogaster mixtus*; 6 *a*, head of ditto.

Fig. 7.—Larva of *Strongylogaster delicatulus*; 7 *a*, segment of abdomen.

Fig. 8.—*Allantus flavipes* (after Curtis).

Fig. 9.—Larva of *Tenthredo colon* (after Van Vollenhoven).

Phyto. Hymen.i Plate 1.



[illegible] West, Newman & Co.

PLATE II.

Fig. 1.—Larva of *Emphytus calceatus.*

Fig. 2.—Larva of *Poecilosoma pulveratum;* 2 *a,* id., last moult.

Fig. 3.—Larva of *Taxonus glabratus;* 3 *a,* head of ditto.

Fig. 4.—Larva of *Eriocampa annulipes,* last moult; 4 *a,* younger.

Fig. 5.—Larva of *Eriocampa rosæ.*

Fig. 6.—Larva of *Fenusa melanopoda;* 6 *a,* under side; 6 *b,* cocoon of *Phyllotoma microcephala.*

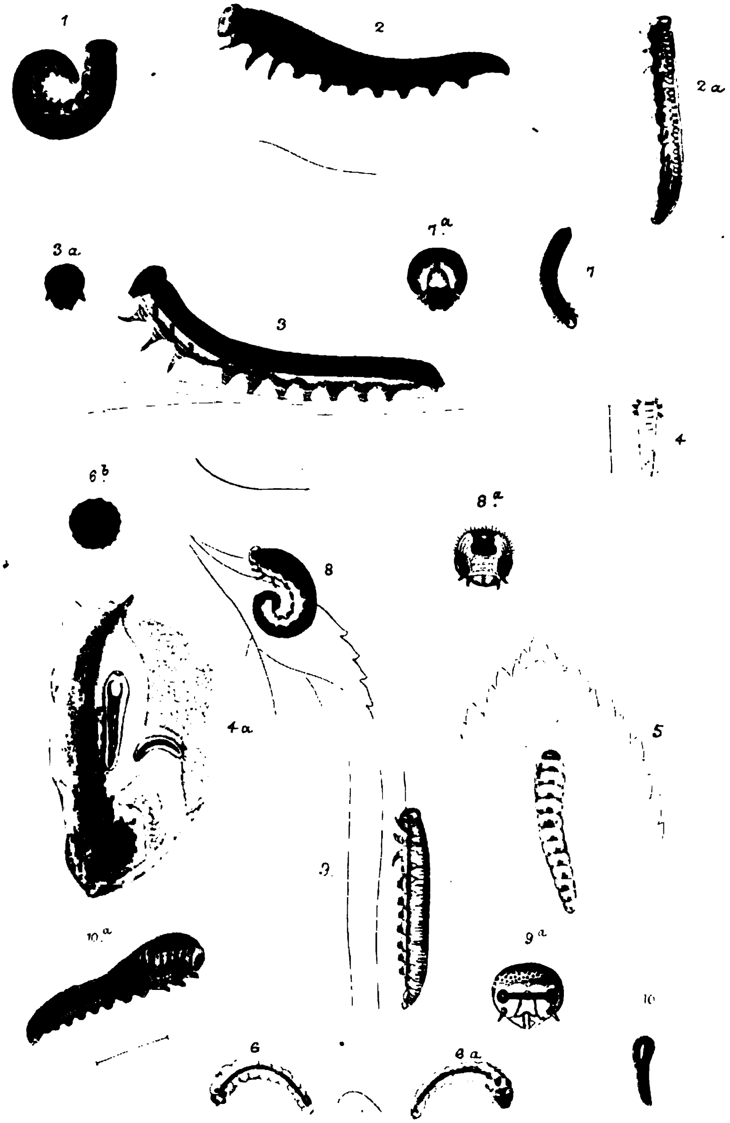
Fig. 7.—Larva of *Blennocampa albipes;* 7 *a,* head of ditto (after Van Vollenhoven).

Fig. 8.—Larva of *Macrophya albicincta;* 8 *a,* head (after Van Vollenhoven).

Fig. 9.—Larva of *Selandria Sixii* (after Van Vollenhoven).

Fig. 10.—Larva of *Eriocampa limacina;* 10 *a,* enlarged, last moult.

Phyto. Hymen. i. Plate 2.



J. J. King del. ad nat.

West, Newman & Co. sc.

PLATE III.

Fig. 1.—Larva of *Blennocampa pusilla*; 1 *a*, rolled down leaf of rose.

Fig. 2.—Larva of *Nematus capreæ.*

Fig. 3.—Larva of *Hemichroa rufa.*

Fig. 4.—Larva of *Dineura viridídorsata* (*Degeeri*, Kl.).

Fig. 5 (1 *a* and 1 *b*).—Larva of *Eriocampa ovata*; 1 *b*, last moult.

Fig. 7.—Larva of *Dineura stilata.*

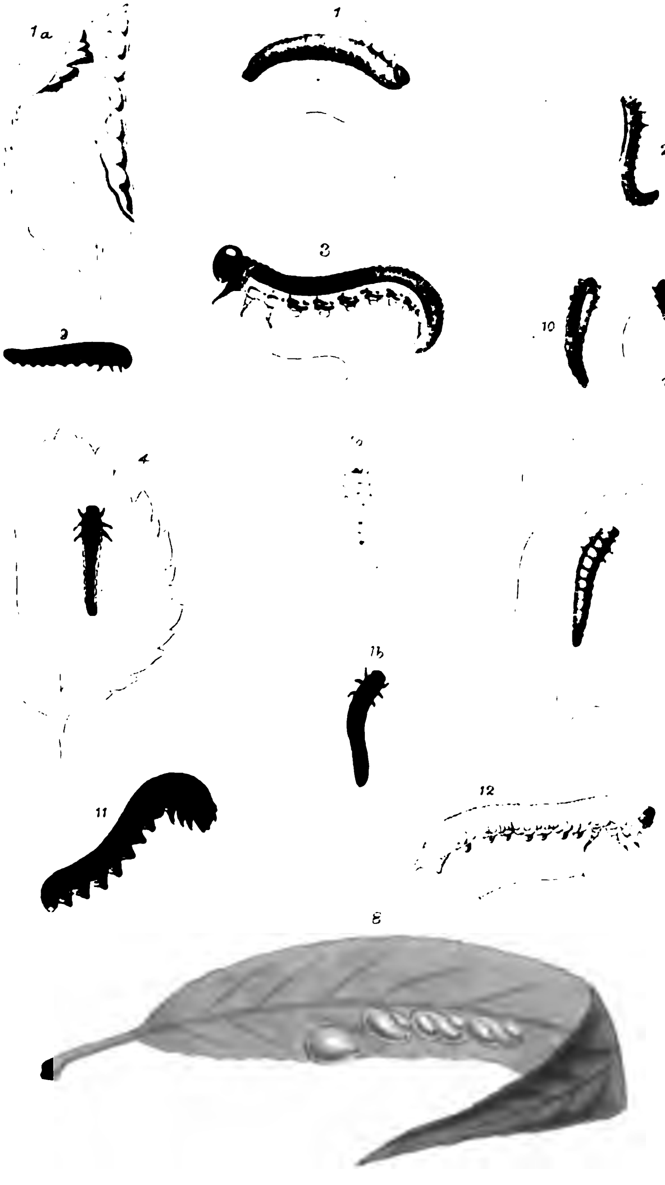
Fig. 8.—Gall of *Nematus gallicola.*

Fig. 9.—Larva of *Athalia scutellariæ.*

Figs. 10 and 10 *a*.—Larva of *Phyllotoma microcephala.*

Fig. 11.—Larva of *Athalia spinarum.*

Fig. 12.—Larva of *Emphytus serotinus* (after Van Vollenhoven).



J. J. King del. ad nat.   [illegible] sc.

PLATE IV.

Fig. 1.—Larva of *Dineura testaceipes.*

Fig. 2.—Larva of *Camponiscus luridiventris.*

Fig. 3.—Mine of *Phyllotoma nemorata.*

Fig. 4.—Larva of *Crœsus varus.*

Fig. 5.—Larva of *Crœsus septentrionalis.*

Fig. 6.—Larva of *Nematus,* sp. (on birch). 6 *a*, enlarged segment.

Fig. 7.—Larva of ?

Fig. 8.—Larva of *Nematus conductus.*

Fig. 9.—Larva of *Nematus fallax.*

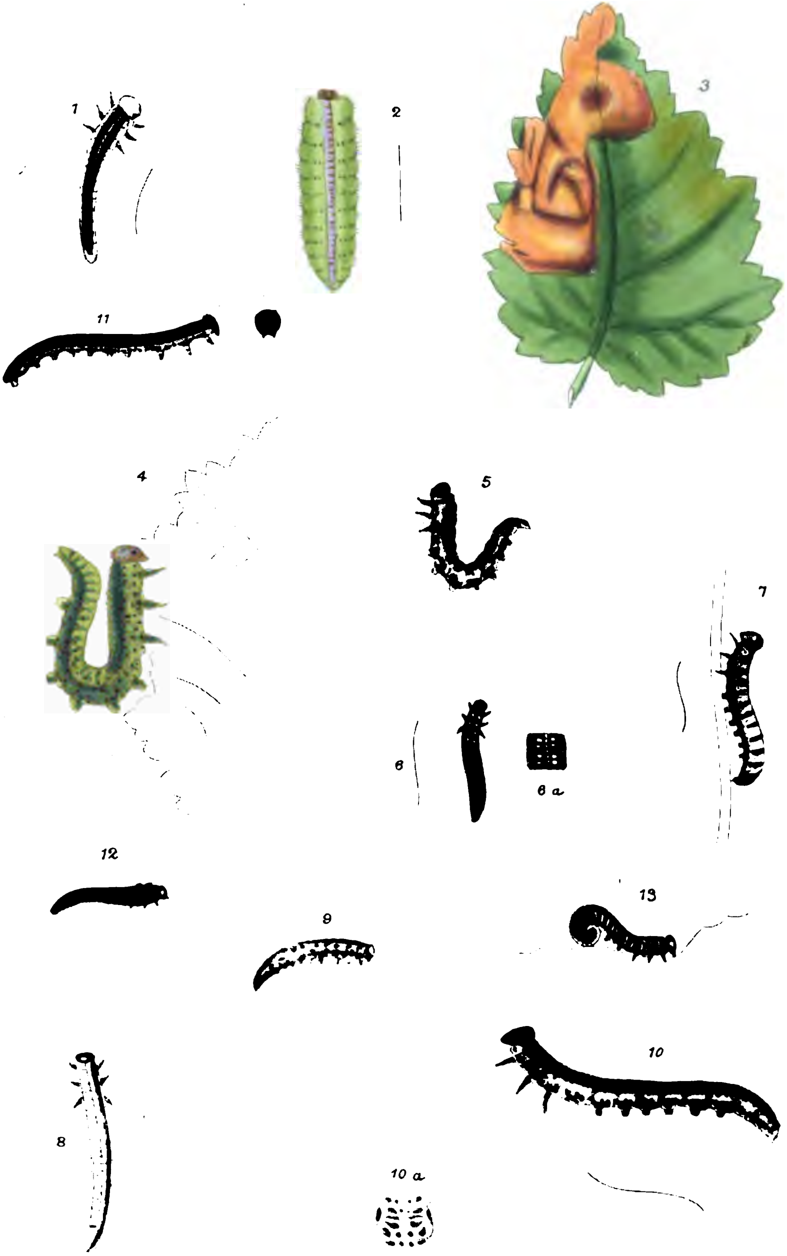
Fig. 10.—Larva of *Nematus cadderensis;* 10 *a*, segment of abdomen.

Fig. 11.—Larva of *Nematus dorsatus.*

Fig. 12.—Larva of *Poecilosoma luteolum.*

Fig. 13.—Larva of *Nematus palliatus.*

Phyto. Hymen. i. Plate 4.



J. J. King del. ad nat.

West Newman & Co. imp.

PLATE V.

Fig. 1.—Larva of *Cladius brullæi*; 1 *a*, head; 1 *b*, segment of abdomen.

Fig. 2.—Larva of *Cladius viminalis.*

Fig. 3.—Larva of *Nematus leucostictus*; 3 *a*, head; 3 *b*, last segments.

Fig. 4.—Larva of *Cladius padi*; 4 *a*, head.

Fig. 5.—Gall of *Nematus ischnocerus*, upper side; 5 *a*, lower side.

Fig. 6.—Larva of *Cladius padi* variety.

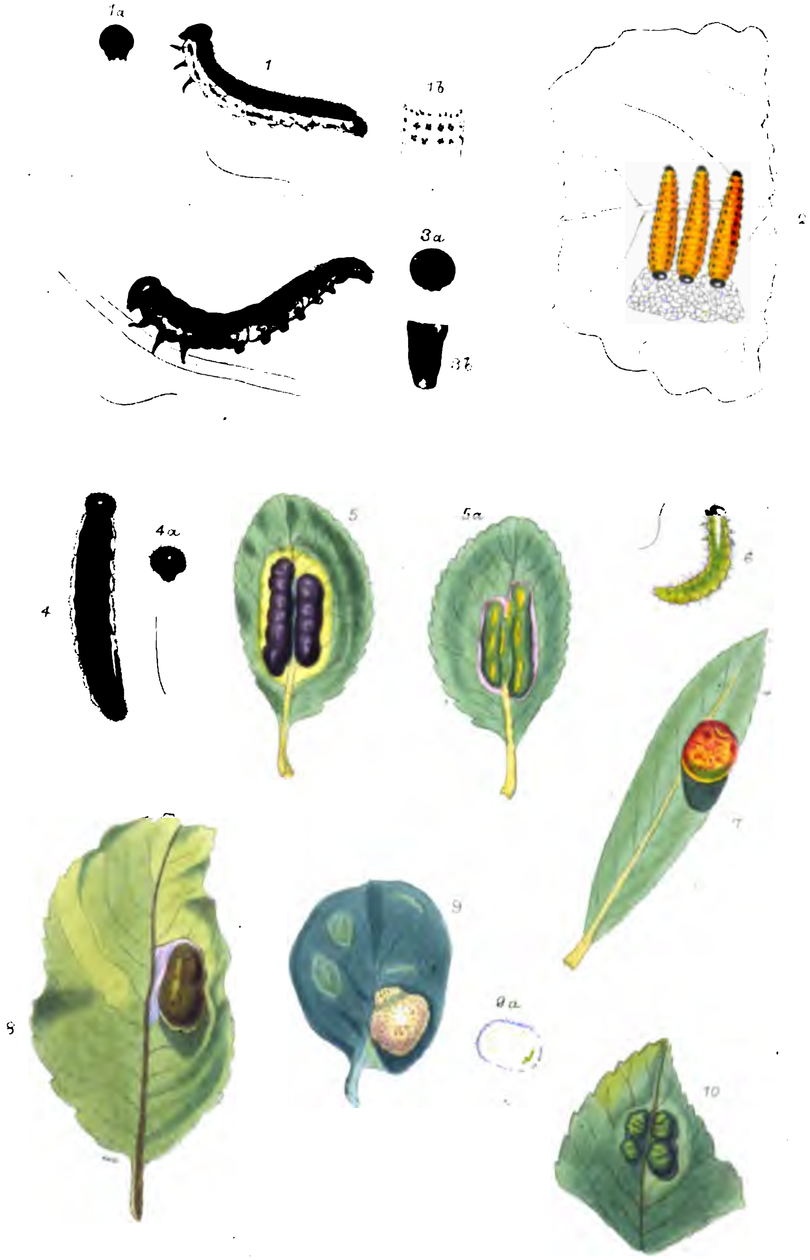
Fig. 7.—Gall of *Nematus viminalis.*

Fig. 8.—Gall of *Nematus vesicator.*

Fig. 9.—Gall of *Nematus viminalis* on *Salix aurita*; 9 *a*, section of gall.

Fig. 10.—Gall of *Nematus ischnocerus.*

Phyto. Hymen. 1. Plate 5.



J. J. King del. ad nat.

W. West & Co. sc.

PLATE VI.

Fig. 1.—Larva of *Pachyprotasis rapæ;* 1 *a*, last moult; 1 *b*, head.

Fig. 2.—Larva of *Dolerus niger ?* (see p. 181).

Fig. 3.—Larva of *Dolerus fissus;* 3 *a*, maxilla of ditto.; 1, palpus; 2, outer lobe; 3, inner lobe.

Fig. 4.—Larva of *Emphytus cinctus.*

Fig. 5.—Larva of *Phyllotoma vagans.*

Fig. 6.—Larva of *Nematus palliatus.*

Fig. 7.—Larva of *Nematus curtispina.*

Fig. 8.—Larva of *Nematus lacteus.*

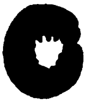
Fig. 9.—Larva of *Nematus abdominalis.*

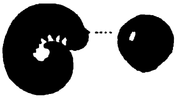
Fig. 10.—Head of larva *Nematus miliaris;* 10 *a*, last segment of ditto.

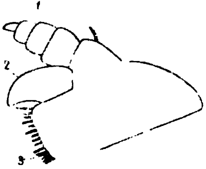
Fig. 11.—Leg of larva of *Tenthredo*, sp.

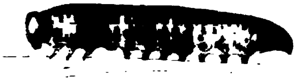
Fig. 12.—Mandible of larva of *Dineura virididorsata.*

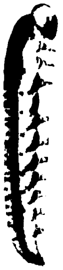
Phyto. Hymen. i. Plate 6.


1.

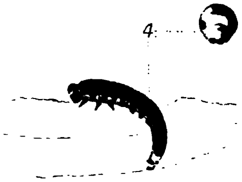

1 a

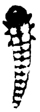

3 a

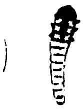

2.

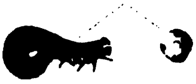

3.

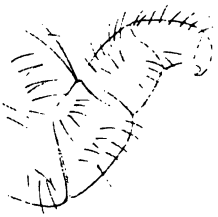
9 a

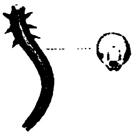

4.

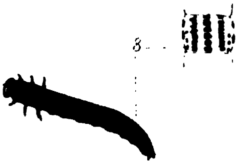

5


5 a


6.


11

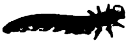

7

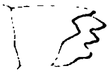

8

13.

10.

10 a


9.


12.

J. T. King del. ad nat.

West Newman & Co sc.

PLATE VII.

Fig. 1.—Larva of *Pœcilosoma submuticum* (see p. 217).

Fig. 2.—Larva of *Emphytus togatus;* 2 *a*, last moult; 2 *b* and 2 *c*, head.

Fig. 3.—Larva of *Blennocampa geniculata;* 3 *a*, spine; 3 *b*, head.

Fig. 4.—Segment of larva of *Blennocampa melanocephalus.*

Fig. 5.—Larva of *Nematus consobrinus;* 5 *a*, apical segments (after Van Vollenhoven).

Fig. 6.—Larva of *Nematus coeruleocarpus* on poplar leaf; 6 *a*, segment of abdomen.

Fig. 7.—Larva of *Nematus ribesii;* 7 *a*, pupa; 7 *b*, eggs.

Fig. 8.—Segment of abdomen of larva of *Nematus salicivorus;* 8 *a*, head; 8 *b*, anal segment.

Fig. 9.—Larva of *Nematus salicis* (after Brischke).

Fig. 10.—Segment of larva of *Nematus glutinosæ;* 10 *a*, anal segment; 10 *b*, head.

Fig. 11.—Anal segment of larva of *Nematus nigrolineatus;* 11 *a*, head.

Phyto. Hymen. i. Plate 7.

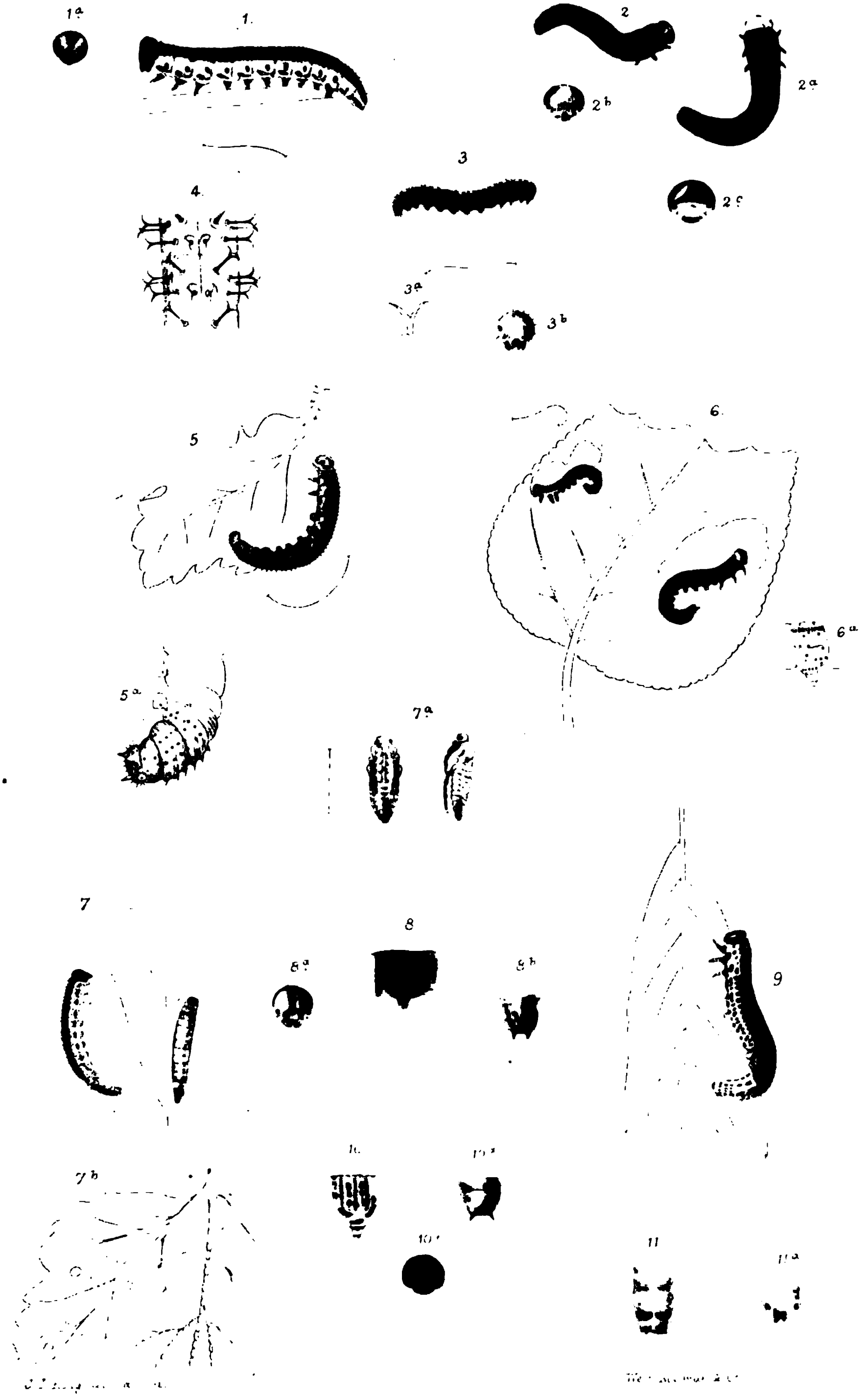


PLATE VIII.

Fig. 1.—*Tenthredo Lachlaniana* ♀; 1 *a*, id., antennæ; 1 *b*, head from the front.

Fig. 2.—*Tenthredo maculata* ♂; 2 *a*, id., claws; 2 *b*, head in front.

Fig. 3.—*Tenthredo zonata;* outer spur of tibiæ.

Fig. 4.—Saw of *Tenthredo viridis.*

Fig. 5.—Saw of *Tenthredo atra.*

Fig. 6.—*Tenthredo velox* ♂.

Fig. 7.—*Tenthredo picta* ♂.

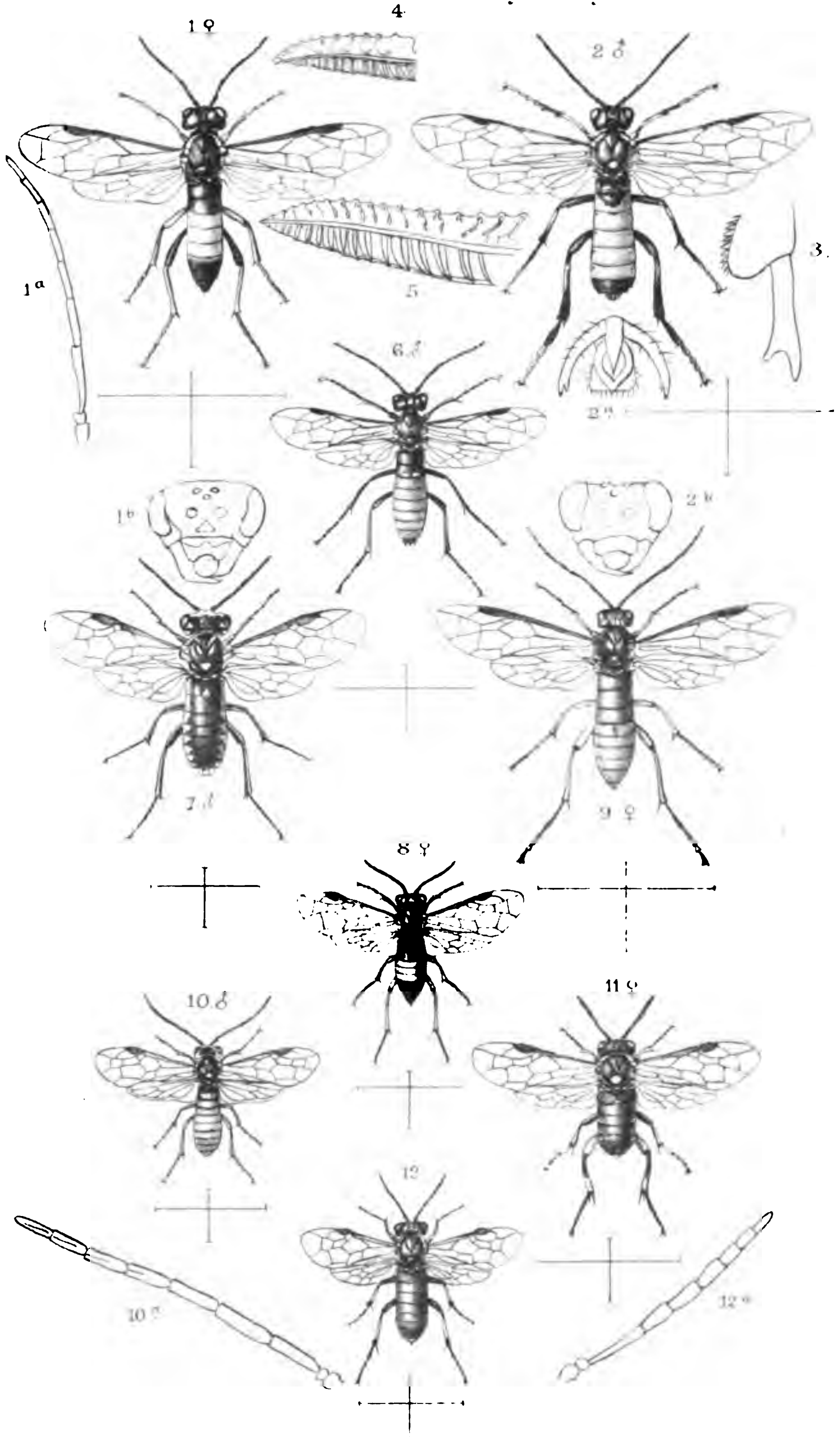
Fig. 8.—*Tenthredo gibbosa* ♀.

Fig. 9.—*Tenthredopsis cordata.*

Fig. 10.—*Synærema rubi* ♂; 10 *a*, id., antennæ.

Fig. 11.—*Macrophya punctum album.*

Fig. 12.—*Macrophya albipuncta;* 12 *a*, id., antennæ.



E. A. Smith del et lith

Mintern

PLATE IX.

Fig. 1.—*Pachyprotasis antennata* ♀ ; 1 *a*, antenna; 1 *b*, leg; 1 *c*, maxilla; 1 *d*, labium; 1 *e*, Saw.

Fig. 2.—*Pachyprotasis rapæ*, Saw.

Fig. 3.—*Allantus viduus* ♀ .

Fig. 4.—*Allantus* 3-*cinctus*; 4 *d*, antenna. 4 *a*, labium of, and 4 *b*, maxilla of *A. arcuatus*.

Fig. 5.—Saw of *Allantus arcuatus*.

Fig. 6.—*Sciopteryx costalis* ♀ ; 6 *a*, antenna; 6 *b*, head from the side; 6 *c*, head from front.

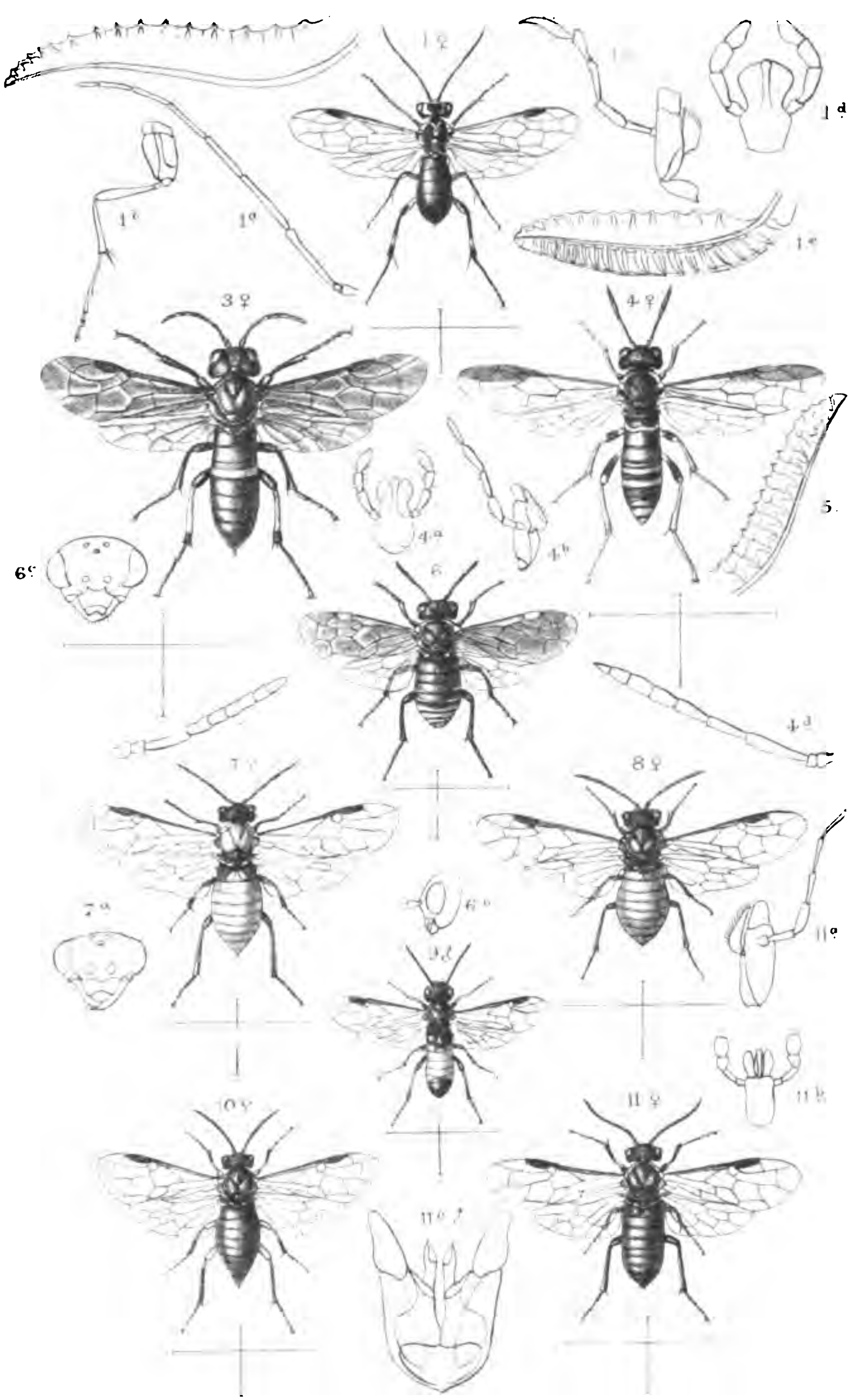
Fig. 7.—*Dolerus fulviventris* ♀ ; 7 *a*, head from front.

Fig. 8.—*Dolerus Chappelli*.

Fig. 9.—*Dolerus fulviventris*.

Fig. 10.—*Dolerus gonagra*; 11 *a*, maxilla; 11 *b*, labium.

Fig. 11.—*Dolerus hæmatodis*; 11 *c*, ♂ genital organs of *D. gonagra*.



F. A. Smith del. et lith.

Mintern

PLATE X.

Fig. 1.—*Hylotoma*; 17, pronotum; 18, middle lobe of mesonotum; 19, 20, lateral lobes of mesonotum; 21, scutellum; 22, cenchri; 23, spines on tibiæ; 24, spurs on tibiæ (calcaria).

Anterior wings.—*Cellules* (left side): 1, radial; 2, appendicular; 3, 4, 5, 6, cubital; 7, humeral; 8, 1st discoidal; 9, 2nd discoidal; 12, 3rd discoidal; 10, 1st posterior; 13, 2nd posterior; 11, median; 14, 15, lanceolate; 16, costal.

Posterior wings.—4, appendicular; 3, radial; 5, 6, cubital; 1, costal; 7, 8 discoidal; 9, 11, posterior.

Nervures—Anterior wing.—*a*, costal; *b*, subcostal; *c*, median; *d*, anal; *e*, accessory; *f*, inferior; *o*, radial; *p*, cubital; *m n*, recurrent; *g* (dotted line), position of transverse radial when present (it is absent in *Hylotoma*); *i j k*, transverse cubital nervures.

Posterior wing.—*a*, costal; *b*, subcostal; *c*, cubital; *d*, anal; *e*, tr. median (= tr. discoidal); *f*, recurrent; *g*, transverse cubital; *e* (bis), accessory.

Fig. 2.—Labium of *Zaræa*.

Fig. 3.—Maxilla of *Zaræa*; 1, inner lobe; 2, outer; 3, stipes; 4, cardo; 6, palpus.

Fig. 4.—Abdomen of *Cimbex* from under side.

Fig. 5.—Ovipositor of *Trichiosoma* (the pieces separated); 1, "triangular" plate; 5, "oblong" plate; 4, basal attachment of support; 3, apical attachment; 2, attachment of saw to "triangular" plate.

Fig. 5 *a*.—Ovipositor of *Trichiosoma* from lower side in natural position; 1, sheath of saw; 2, cerci; 3, hypopygial valves=quadrangular plates of *Kræpelin*; 4, triangular plate; 6, oblong plate.

Fig. 6.—Tarsus of *Cimbex*; 1, patella.

Fig. 7.—Head of *Clavellaria*; 1, clypeus; 2, labrum; 4, eyes; 3, ocelli; 5, mandibles.

Fig. 8.—Coxa and trochanter (1) of *Trichiosoma*.

Fig. 9.—Mandible of *Zaræa*.

Fig. 10.—Mandible of *Hylotoma*.

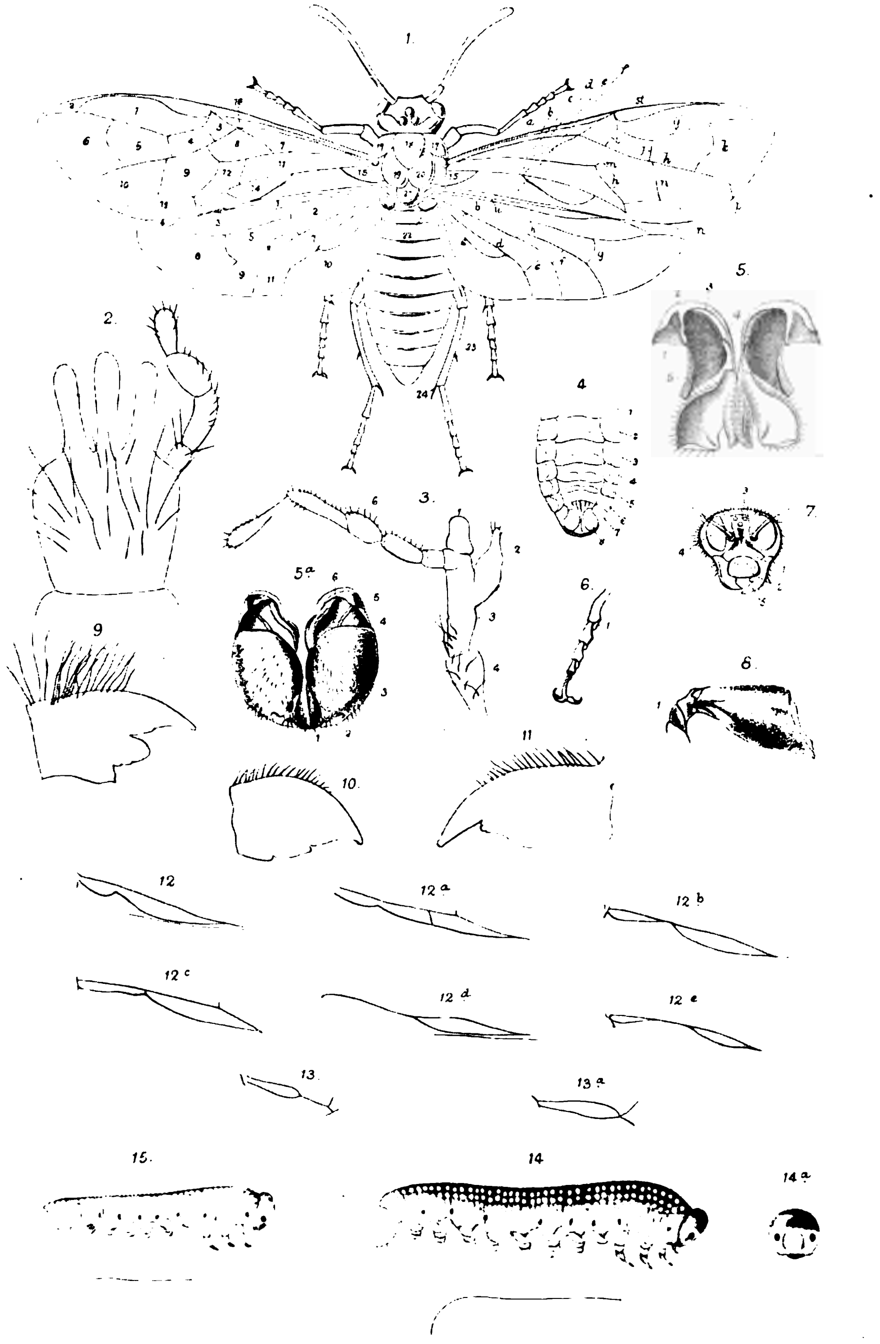
Fig. 11.—Mandible of *Cladius*.

Fig. 12.—Open lanceolate cellule; 12 *a*, lanceolate cellule with oblique cross nervure; 12 *b*, subcontracted cellule; 12 *c*, with perpendicular cross nervure; 12 *d*, petiolated; 12 *e*, contracted.

Fig. 13.—Appendiculated accessory nervure in hind wing; 13 *a*, interstitial accessory nervure in hind wing.

Fig. 14.—Larva of *Trichiosoma vitellinæ*; 14 *a*, head.

Fig. 15.—Young larva of *T. vitellinæ*.



[illegible] del. ad nat.

West Newman & C[illegible]

PLATE XI.

Fig. 1.—*Athalia scutellariæ;* 1 *c*, antenna; 1 *a*, maxilla; 1 *b*, labium of *Athalia rosæ.*

Fig. 2.—*Strongylogaster femoralis.*

Fig. 3.—*Strongylogaster delicatulus; a*, anal cellule.

Fig. 4.—*Pœcilosoma Fletcheri.*

Fig. 5.—*Pœcilosoma guttatum.*

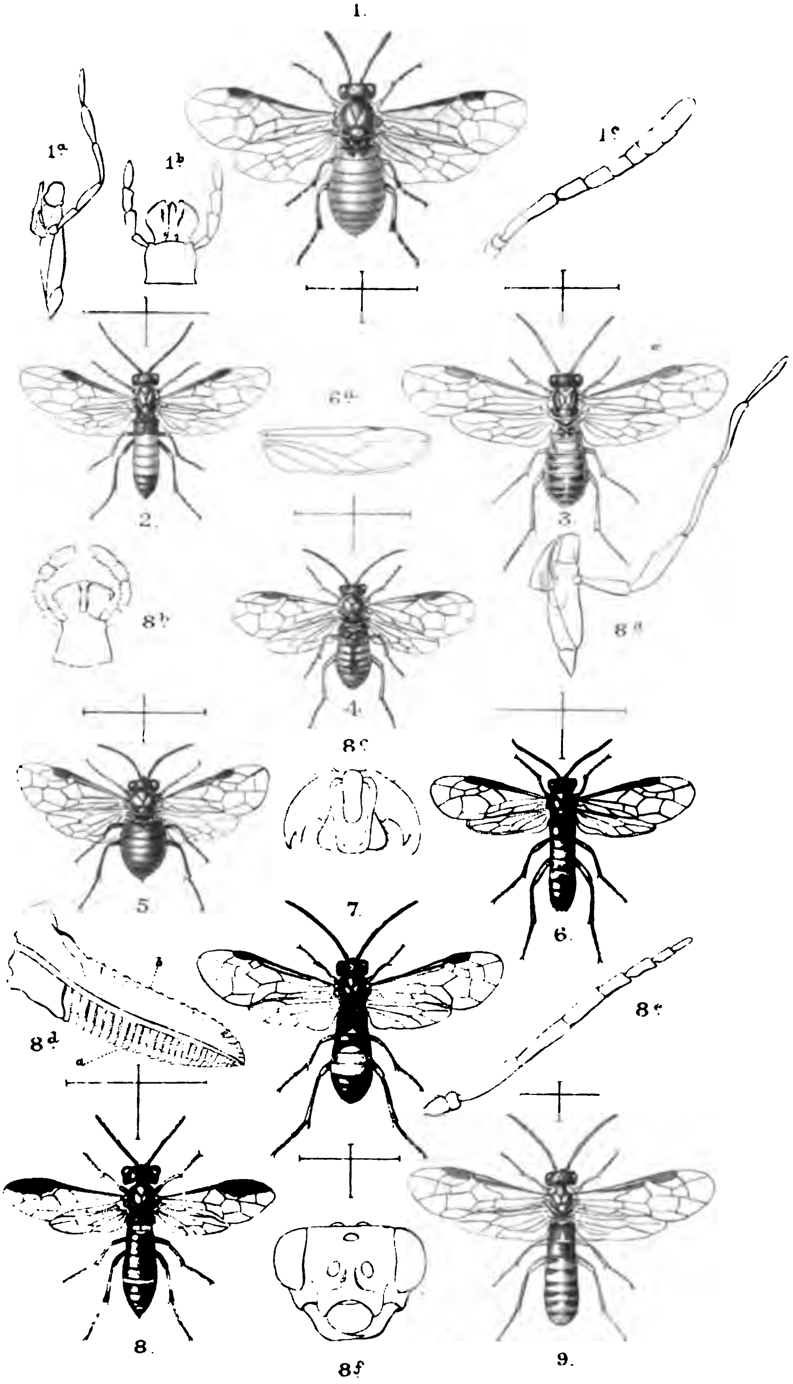
Fig. 6.—*Taxonus agrorum* ♂; 6 *a*, posterior wing of ♂.

Fig. 7.—*Taxonus equiseti*, Scotch var.

Fig. 8.—*Emphytus togatus;* 8 *a*, maxilla; 8 *b*, labium; 8 *c*, claws; 8 *d*, saw; 8 *e*, antenna; 8 *f*, head in front.

Fig. 9.—*Emphytus perla.*

Phyto. Hymen. i. Plate II.

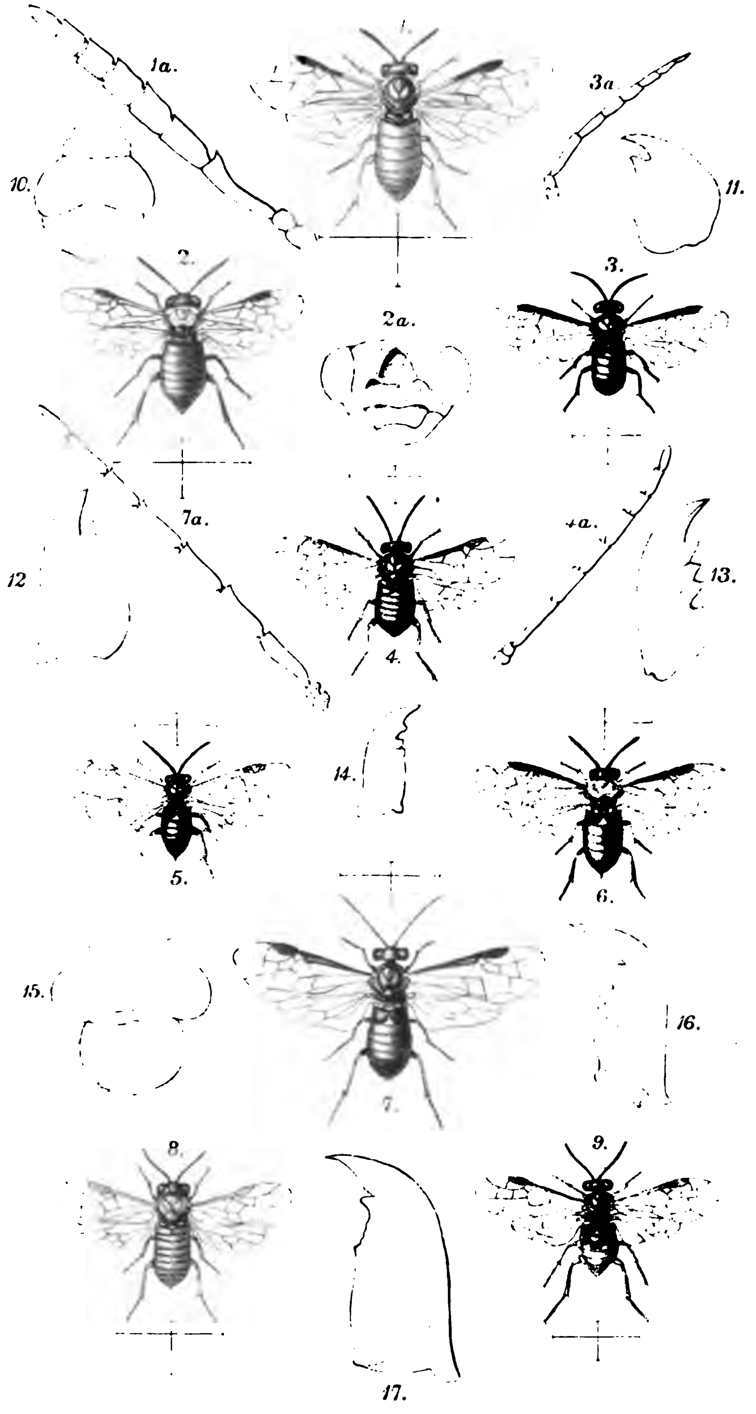


E.A. Smith del et lith.

Mintern Bros imp

PLATE XII.

Fig. 1.—*Selandria Sixii*; 1 *a*, antenna.
Fig. 2.—*Eriocampa ovata*; 2 *a*, head.
Fig. 3.—*Eriocampa rosæ*; 3 *a*, antenna.
Fig. 4.—*Dineura fuscula*; 4 *a*, antenna.
Fig. 5.—*Blennocampa lineolata.*
Fig. 6.—*Blennocampa eppiphium.*
Fig. 7.—*Blennocampa alchemillæ.*
Fig. 8.—*Blennocampa melanocephalus.*
Fig. 9.—*Hoplocampa pectoralis.*
Fig. 10.—Clypeus and labium of *Selandria serva.*
Fig. 11.—Mandible of *Selandria serva.*
Fig. 12.—Mandible of *Blennocampa fuscipennis.*
Fig. 13.—Mandible of *Allantus arcuatus.*
Fig. 14.—Mandible of *Dolerus.*
Fig. 15.—Labrum of *Tenthredo livida.*
Fig. 16.—Mandible of *Tenthredo livida.*
Fig. 17.—Mandible of *Tenthredopsis nigricollis.*



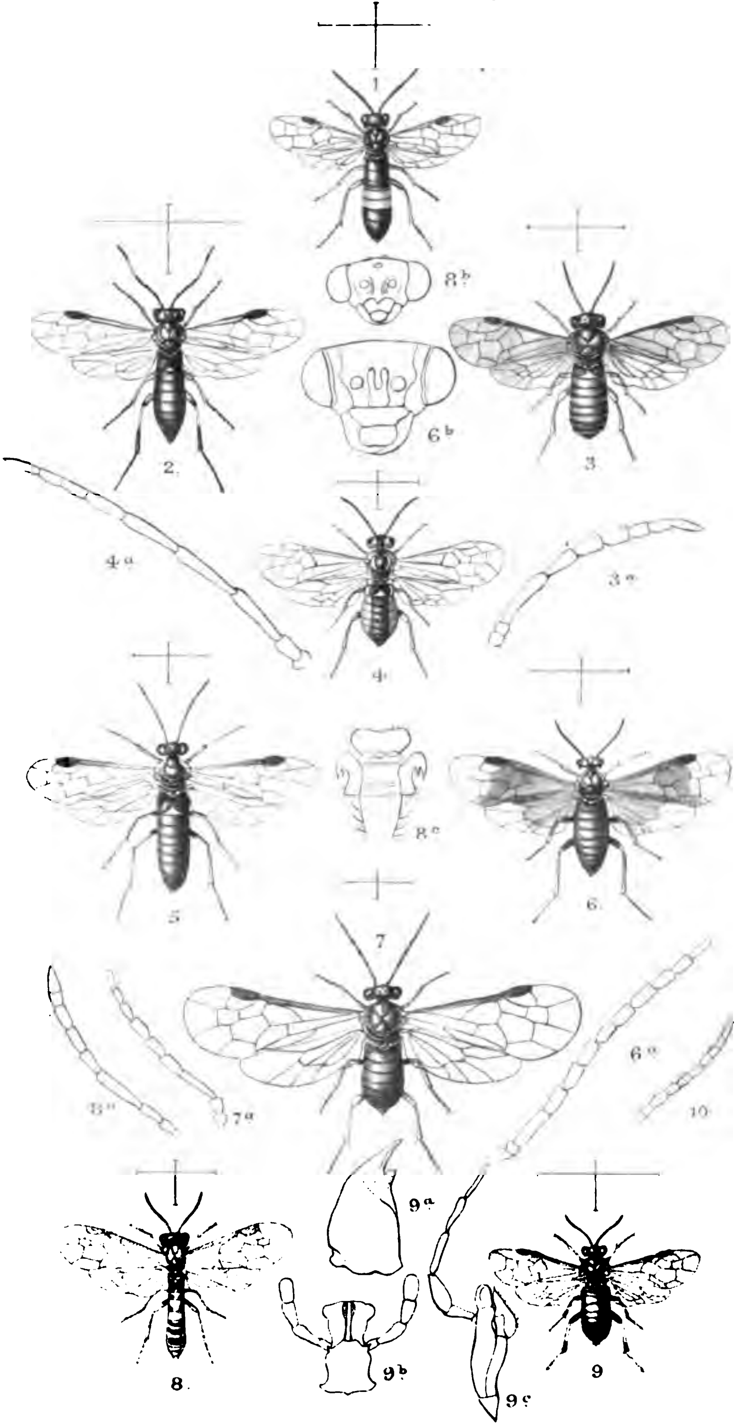
F. Smith del et lith.

Mintern Bros. imp.

PLATE XIII.

Fig. 1.—*Emphytus calceatus.*
Fig. 2.—*Emphytus tibialis.*
Fig. 3.—*Selandria morio;* 3 *a*, antenna.
Fig. 4.—*Harpiphorus lepidus;* 4 *a*, antenna.
Fig. 5.—*Phyllotoma ochropoda* ♂.
Fig. 6.—*Phyllotoma nemorata;* 6 *a*, antenna; 6 *b*, head.
Fig. 7.—*Fenusa albipes;* 7 *a*, antenna.
Fig. 8.—*Heptamelus ochroleucus;* 8 *a*, antenna; 8 *b*, head; 8 *c*, claw.
Fig. 9.—*Selandria aperta;* 9 *a*, mandible; 9 *b*, labium; 9 *c*, maxilla of *S. serva.*
Fig. 10.—Antenna of *Fenella nigrita.*

Phyto. Hymen. i. Plate 13.



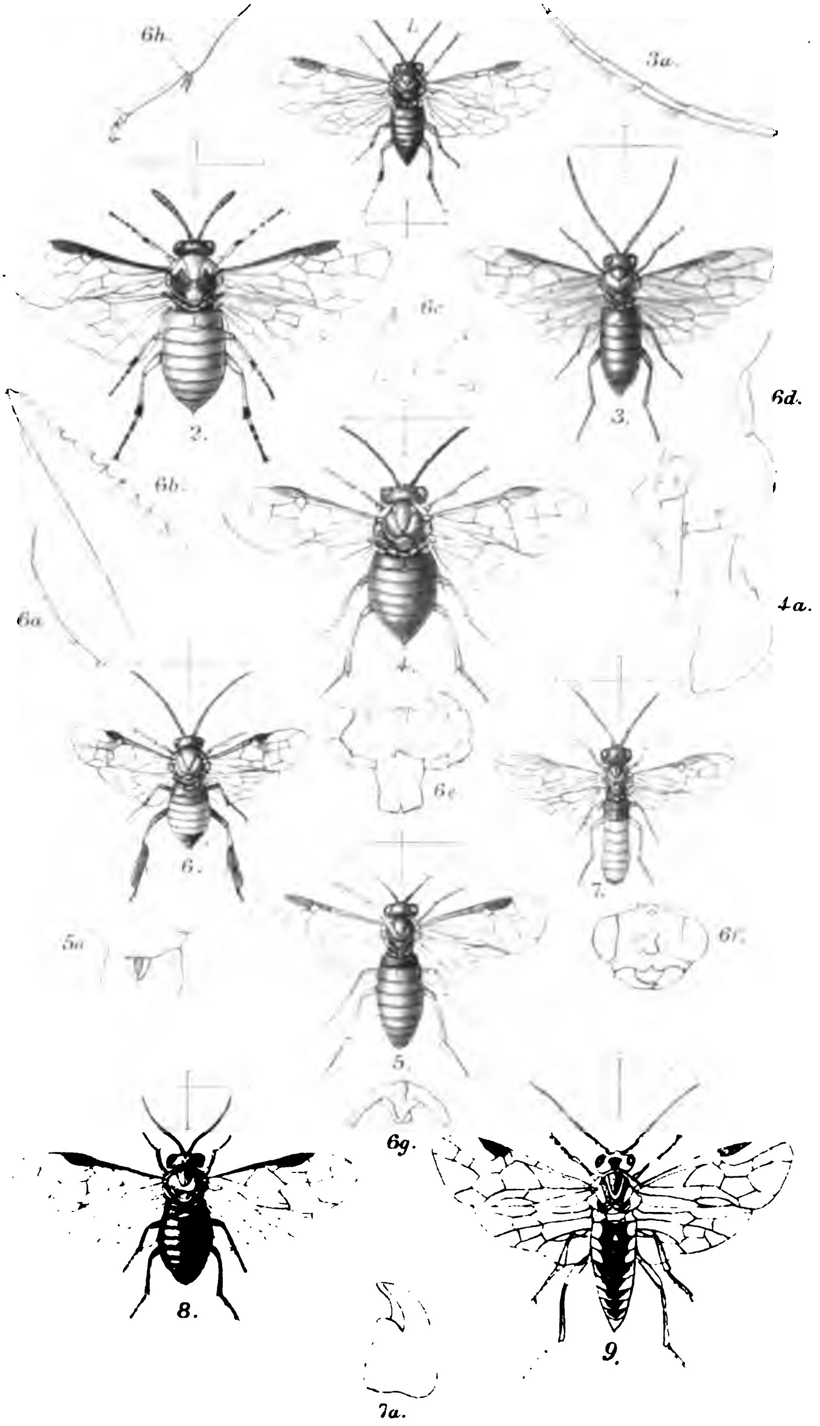
E. A. Smith del et lith.

Mintern Bros. imp.

PLATE XIV.

Fig. 1.—*Hoplocampa chrysorrhœa.*
Fig. 2.—*Athalia spinarum.*
Fig. 3.—*Blennocampa aterrima ;* 3 *a*, antenna.
Fig. 4.—*Dineura opaca ;* 4 *a*, mandible.
Fig. 5.—*Dineura stilata ;* 5 *a*, cerci.
Fig. 6.—*Croesus septentrionalis ;* 6 *a*, antenna ; 6 *b*, saw ; 6 *c*, mandible ; 6 *d*, maxilla ; 6 *e*, labium ; 6 *f*, head ; 6 *g*, claw ; 6 *h*, tarsus.
Fig. 7.—*Strongylogaster cingulatus* ♂ ; 7 *a*, mandible.
Fig. 8.—*Hemichroa alni.*
Fig. 9.—*Nematus imperfectus.*

Phyto. Hymen. i. Plate 14.



F. Smith del et lith.

Mintern Bros imp

PLATE XV.

Fig. 1.—*Cladius difformis* ♂ ; *b*, transverse basal nervure; *c*, transverse median; 1 *a*, antenna.

Fig. 2.—*Cladius difformis ;* 2 *a*, antenna.

Fig. 3.—*Cladius viminalis* ♂ ; 3 *a*, antenna; 3 *b*, face.

Fig. 4.—Antenna of *Cladius padi* ♂.

Fig. 5.—*Cladius padi* ♀ ; 5 *a*, antenna.

Fig. 6.—Internal process in mesosternum of *Dolerus*.

Fig. 7.—Prosternum of *Dolerus*.

Fig. 8.—Simple claw of *Cimbex*.

Fig. 9.—Claw with a tooth (*Dolerus*).

Fig. 10.—Bifid (*Tenthredo*).

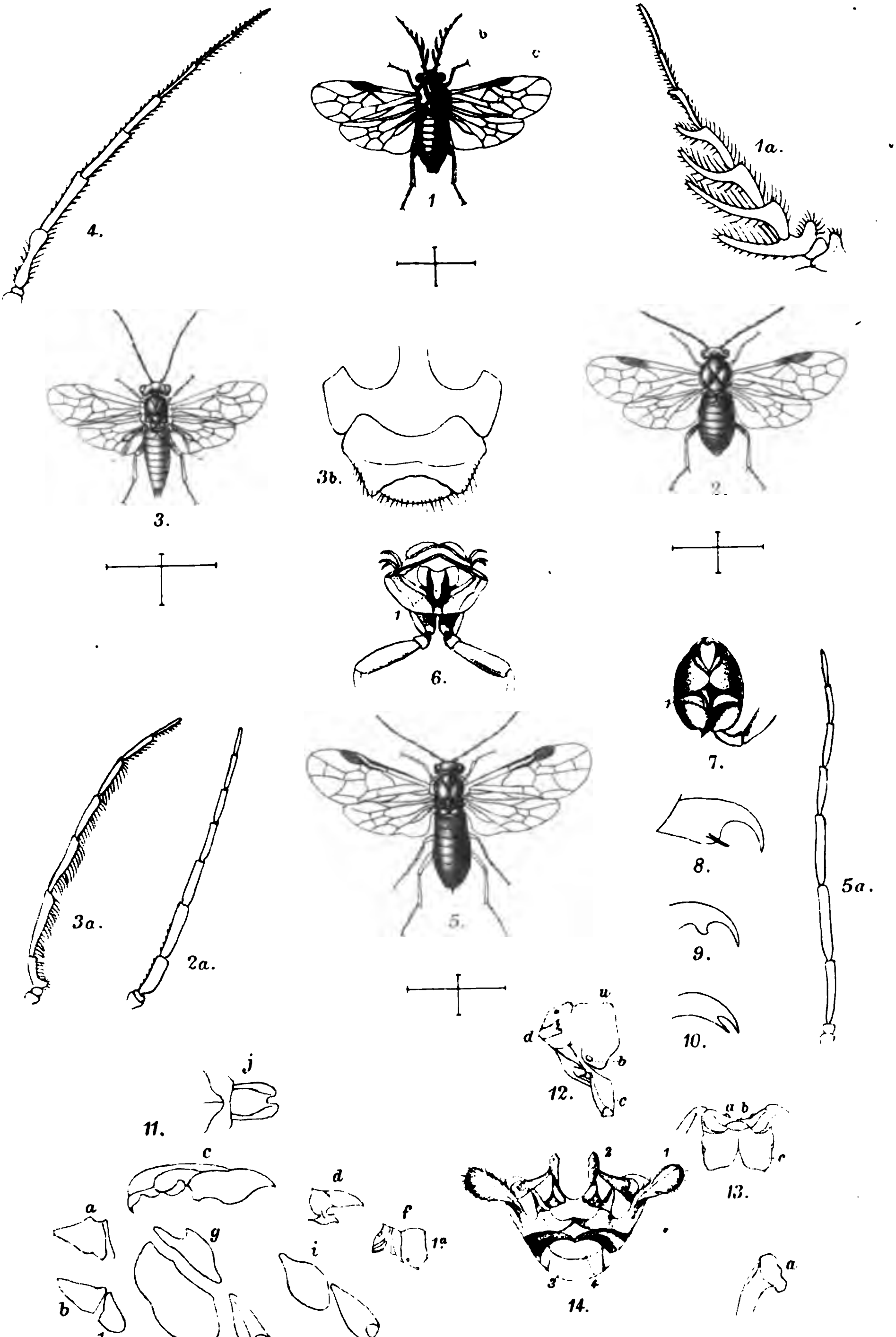
Fig. 11.—Thorax of *Tenthredo ;* 1, 2, 3, coxæ ; *a*, pronotum ; *b*, episternum ; *c*, mesonotum ; *g*, mesosternum ; *n*, epimera ; *d*, mesophragma (lateral view) ; *j*, from above ; *f*, metanotum ; *i*, metasternum ; 1 *a*, intermediate segment.

Fig. 12.—Metathorax of *Tenthredopsis ; d*, posterior wings ; *u*, intermediate segment ; *d*, stigma ; *c*, coxa.

Fig. 13.—Ditto from above ; *a*, cenchri ; *c*, intermediate segment.

Fig. 14.—♂ genital organs of *Trichiosoma ;* 2, penis ; *a*, from the side ; 1, double-jointed valve.

Phyto. Hymen. i. Plate 15.



R. Mintern lith.

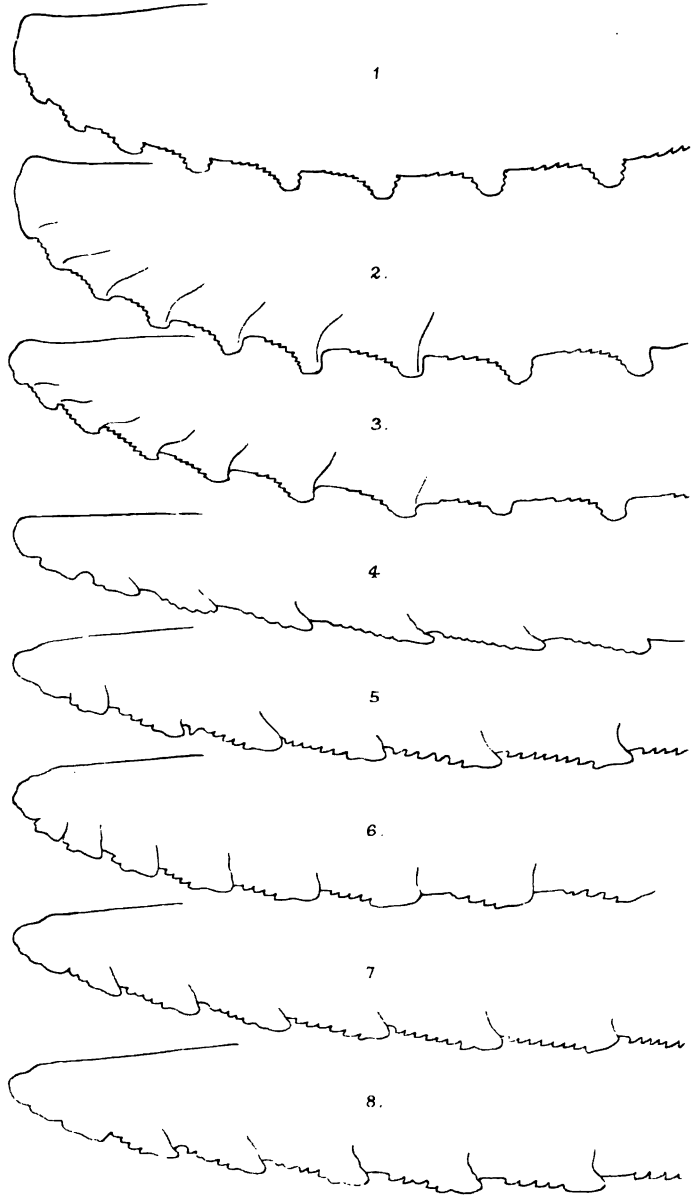
Mintern Bro's

PLATE XVI.

Fig. 1.—Saw of *Tenthredo dispar.*
Fig. 2.—Saw of *Tenthredo scotica.*
Fig. 3.—Saw of *Tenthredo atra.*
Fig. 4.—Saw of *Tenthredopsis cordata.*
Fig. 5.—Saw of *Tenthredopsis microcephala.*
Fig. 6.—Saw of *Tenthredopsis femoralis.*
Fig. 7.—Saw of *Tenthredopsis caliginosa.*
Fig. 8.—Saw of *Tenthredopsis cordata.* Aberration.
(Figs. 4 and 8 are the two parts of the same saw).

Except when otherwise noted the saws are magnified × 200.

Phyto Hymen. i. Plate 16.



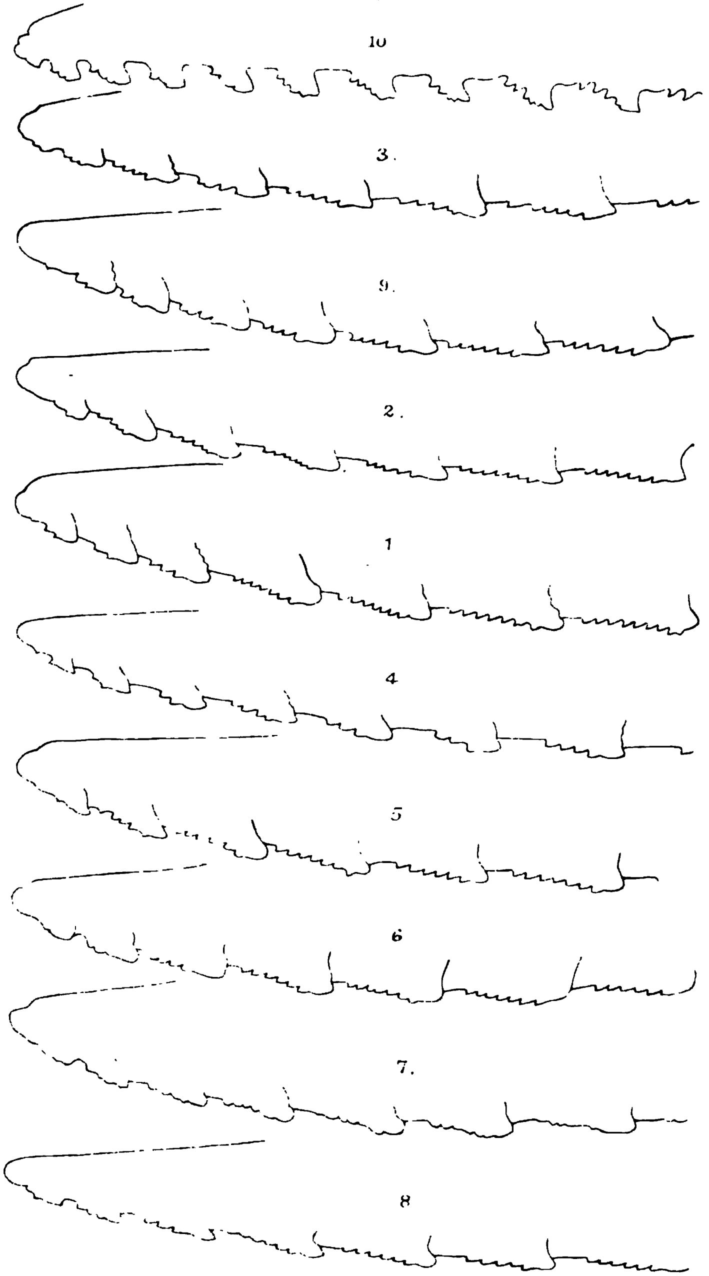
W Purkiss del ad nat

West Newman & C° imp.

PLATE XVII.

Fig. 1.—Saw of *Tenthredopsis ignobilis.*
Fig. 2.—Saw of *Tenthredopsis nigricollis.*
Fig. 3.—Saw of *Tenthredopsis scutellaris.*
Fig. 4.—Saw of *Tenthredopsis flavomaculata.*
Fig. 5.—Saw of *Tenthredopsis picticeps.*
Fig. 6.—Saw of *Tenthredopsis tristis.*
Fig. 7.—Saw of *Tenthredopsis lividiventris.*
Fig. 8.—Saw of *Tenthredopsis albomaculata.*
Fig. 9.—Saw of *Tenthredopsis nigronotata.*
Fig. 10.—Saw of *Camponiscus luridiventris.*

Phyto.Hymen.i Plate 17.



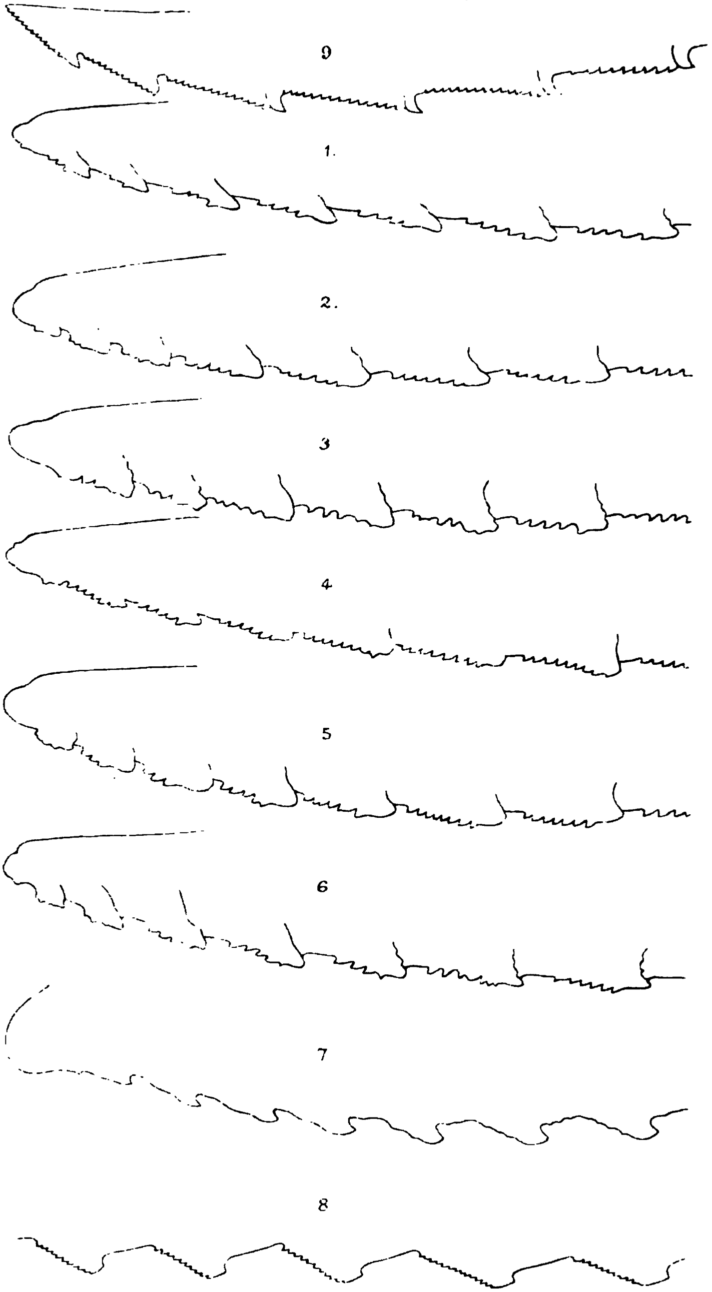
[illegible]

West Newman [illegible]

PLATE XVIII.

Fig. 1.—Saw of *Tenthredopsis nigriceps.*
Fig. 2.—Saw of *Tenthredopsis Saundersi.*
Fig. 3.—Saw of *Tenthredopsis dorsivittata.*
Fig. 4.—Saw of *Tenthredopsis inornata.*
Fig. 5.—Saw of *Tenthredopsis nassata.*
Fig. 6.—Saw of *Tenthredopsis sordida.*
Fig. 7.—Saw of *Dolerus fissus.*
Fig. 8.—Saw of *Dolerus fissus* at base.
Fig. 9.—Saw of *Heptamelus ochroleucus.*

Phyto Hymen. i. Plate 18.



W Purkiss del. ad nat.

West Newman & Co. imp.

PLATE XIX.

Fig. 1.—Saw of *Dolerus scoticus.*

Fig. 2.—Saw of *Dolerus tinctipennis.* × 80.

Fig. 3.—Saw of *Dolerus Gessneri;* 3 *a*, transverse process.

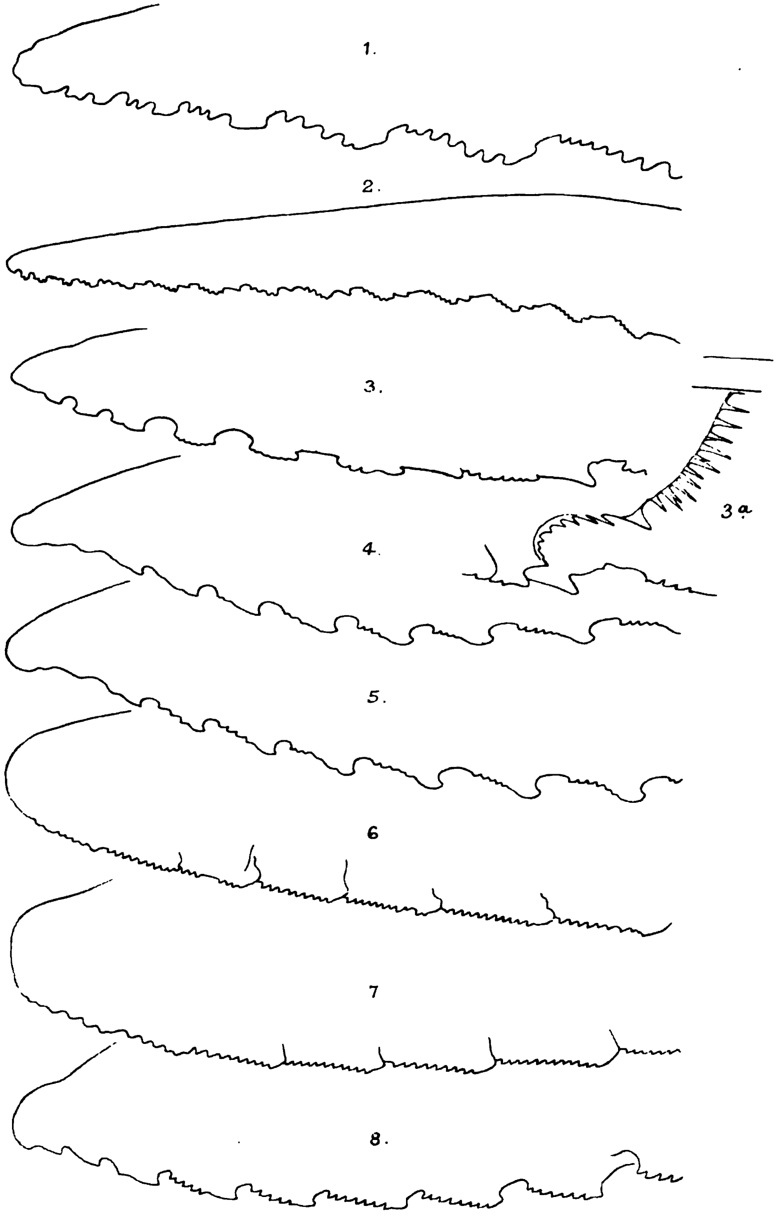
Fig. 4.—Saw of *Dolerus coracinus.*

Fig. 5.—Saw of *Dolerus anthracinus.*

Fig. 6.—Saw of *Dolerus oblongus.*

Fig. 7.—Saw of *Dolerus megapterus.*

Fig. 8.—Saw of *Dolerus possilensis.*



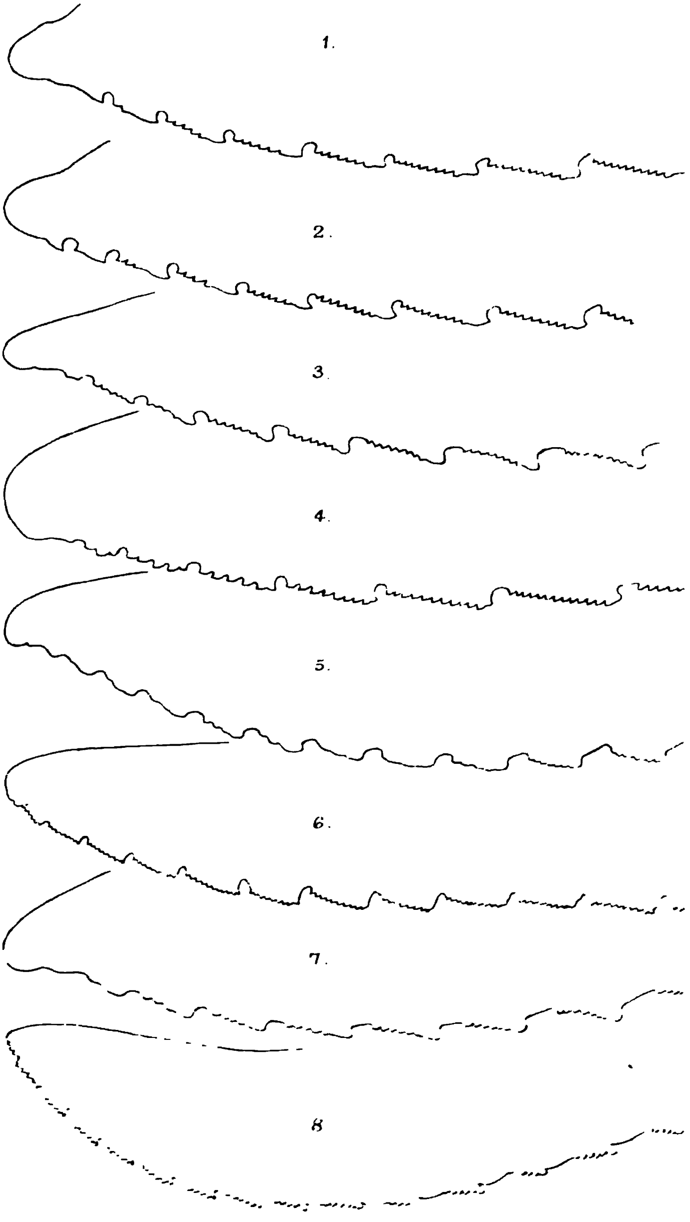
W Purkiss del. ad nat.

West Newman & Co imp.

PLATE XX.

Fig. 1.—Saw of *Dolerus intermedius.*
Fig. 2.—Saw of *Dolerus intermedius*, var. ?
Fig. 3.—Saw of *Dolerus varispinus.*
Fig. 4.—Saw of *Dolerus niger.*
Fig. 5.—Saw of *Dolerus æneus.*
Fig. 6.—Saw of *Taxonus glabratus.*
Fig. 7.—Saw of *Dolerus elongatus.*
Fig. 8.—Saw of *Pœcilosoma pulveratum.*

Phyto. Hymen i. Plate 20.

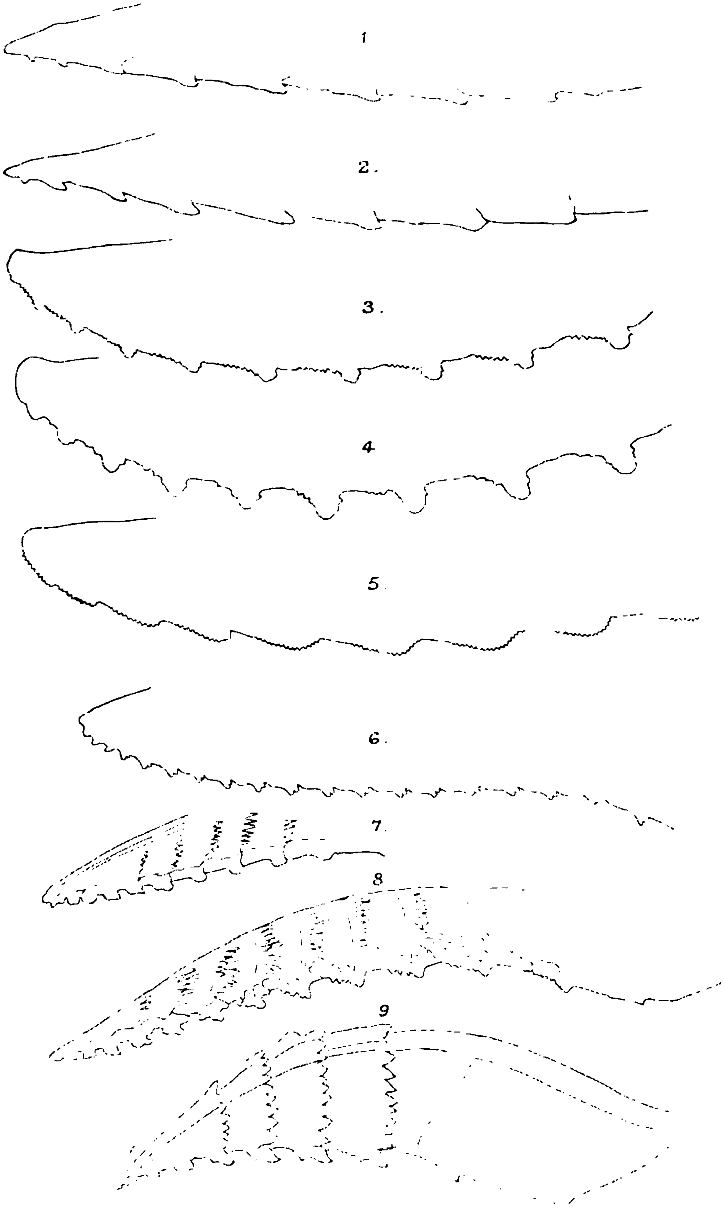


[illegible] [illegible]

PLATE XXI.

Fig. 1.—Saw of *Selandria serva.*
Fig. 2.—Saw of *Selandria Sixii.*
Fig. 3.—Saw of *Pœcilosoma longicorne.*
Fig. 4.—Saw of *Pœcilosoma submuticum.*
Fig. 5.—Saw of *Blennocampa albipes.*
Fig. 6.—Saw of *Eriocampa ovata.* × 100.
Fig. 7.—Saw of *Dineura virididorsata.* × 100.
Fig. 8.—Saw of *Hemichroa alni.* × 80.
Fig. 9.—Saw of *Cladius padi.* × 100.

Phyto. Hymeni Plate 21.



[illegible] del. ad nat.

West Newman & Co. imp.

RAY SOCIETY.

INSTITUTED 1844.

FOR THE PUBLICATION OF WORKS ON
NATURAL HISTORY.

ANNUAL SUBSCRIPTION ONE GUINEA.

LIST

OF

COUNCIL, OFFICERS, LOCAL SECRETARIES, AND SUBSCRIBERS,

TOGETHER WITH THE

TITLES OF THE PUBLICATIONS OF THE SOCIETY,

CORRECTED TO JULY, 1882.

RAY SOC

INSTITU

FOR THE PUBLIC

NATUR

ANNUAL [redacted]

LIST

COUNCIL, OFFICERS,

AND

TITLES OF THE PUBLICA

of the Ray Society,

June, 1882.

esident.

OCK, Bart., M.P., F.R.S.

Council.

H. Lee, Esq., F.L.S.
R. M'Lachlan, Esq., F.R.S.
Dr. J. Millar, F.L.S.
Prof. St. G. Mivart, F.R.S.
F. P. Pascoe, Esq., F.L.S.
H. T. Stainton, Esq., F.R.S.
C. Stewart, Esq., F.L.S.
Capt. C. Tyler, F.L.S.
Dr. E. Hart Vinen, F.L.S.
J. J. Weir, Esq., F.L.S.

Treasurer.

ER, R.S., F.L.S., Basingfield, Basingstoke, Hants.

retary.

OMAS WI M.A., F.L.S., ville Park
E.

Council and Officers of the Ray Society,

Elected 23*rd June*, 1882.

President.

Sir JOHN LUBBOCK, Bart., M.P., F.R.S.

Council.

Prof. R. Bentley, F.L.S.
Dr. Braithwaite, F.L.S.
G. B. Buckton, Esq., F.R.S.
Dr. A. Carpenter.
J. Flower, Esq., M.A., F.Z.S.
C. H. Gatty, Esq., F.L.S.
F. D. Godman, Esq., F.L.S.
F. Grut, Esq., F.L.S.
Dr. J. B. Hicks, F.R.S.
R. Hudson, Esq., F.R.S.
W. R. Hughes, Esq., F.L.S.
H. Lee, Esq., F.L.S.
R. M'Lachlan, Esq., F.R.S.
Dr. J. Millar, F.L.S.
Prof. St. G. Mivart, F.R.S.
F. P. Pascoe, Esq., F.L.S.
H. T. Stainton, Esq., F.R.S.
C. Stewart, Esq., F.L.S.
Capt. C. Tyler, F.L.S.
Dr. E. Hart Vinen, F.L.S.
J. J. Weir, Esq., F.L.S.

Treasurer.

Dr. S. J. A. SALTER, F.R.S., F.L.S., Basingfield, Basingstoke, Hants.

Secretary.

Rev. Prof. THOMAS WILTSHIRE, M.A., F.L.S., 25, Granville Park,
Lewisham, S.E.

LIST OF LOCAL SECRETARIES.

Aberdeen	**Professor Trail.**
Bath	**R. H. Moore, Esq.**
Belfast	**Professor Cunningham.**
Birmingham	**W. R. Hughes, Esq.**
Dublin	**Dr. W. E. Steele.**
Edinburgh	**Professor Balfour.**
Leeds	**L. C. Miall, Esq.**
Liverpool	**Isaac Byerley, Esq.**
Norwich	**F. W. Harmer, Esq.**
Oxford	**Professor Lawson.**
Warrington	**T. G. Rylands, Esq.**

LIST OF SUBSCRIBERS.*

Aberdeen, University of, Aberdeen.
Adlard, J. E., Esq., Bartholomew close, E.C.
Allman, Professor, F.R.S., &c., Sunny hill, Parkstone, Poole, Dorset.
American Institute, New York.
Andrews, Arthur, Esq., Newtown House, Blackrock, Dublin.
Angelin, Professor, Stockholm.
Argyll, Duke of, F.R.S., Argyll Lodge, Kensington, W.
Armstrong, Sir W. G., F.R.S., The Minories, Newcastle-on-Tyne.
Army and Navy Club, 36, Pall Mall, S.W.
Asher, Messrs., 13, Bedford street, W.C.
Ashmolean Society, Oxford.
Asiatic Society of Bombay, 57, Park street, Calcutta.
Athenæum Club, Pall Mall, S.W.
Aubrey, Rev. H. G. W., Rectory, Hale, Salisbury.

Babington, Professor Charles C., M.A., F.R.S., Cambridge.
Babington, the Rev. Professor Churchill, F.L.S., Cockfield Rectory, near Sudbury, Suffolk.
Baer, Herr J., Frankfort.
Baillière, Messrs., 20, King William street, W.C.
Baker, Alfred, Esq., 59, Hagley road, Edgbaston, Birmingham.
Balfour, Professor, M.D., LL.D., F.R.S., L.S., *Local Secretary*, Inverleith House, Edinburgh.
Balfour, F. M., Esq., Trinity College, Cambridge.
Balfour, Prof. I. Bayley, D.Sc., 11, Hillhead Gardens, Glasgow.
Baltimore, Peabody Institute.

---

* The Subscribers are requested to inform the Secretary of *any errors or omissions* in this List, and of any delay in the transmission of the Yearly Volume.

Bastian, Dr. H. C., F.R.S., F.L.S., 20, Queen Anne street, W.
Bath Microscopical Society, care of R. H. Moore, Esq., 4, Abbey street, Bath.
Beaufoy, Mark, Esq., South Lambeth, S.
Belfast Linen Hall Library, Belfast.
Belfast Queen's College, Belfast.
Bell, Dr. W. R., 8, Rutland park villas, Perry hill, Catford bridge, S.E.
Bentley, Professor, R., F.L.S., King's College, Strand, W.C.
Bergen, Museum of, Bergen.
Berlin Royal Library, Berlin.
Binks, J., Esq., Wakefield.
Birmingham Free Library, Birmingham.
Birmingham Old Library, Birmingham.
Birmingham Natural History and Microscopical Society, Birmingham.
Blatch, W. G., Esq., Small Heath, Birmingham.
Blomefield, Rev. L., F.Z.S., 19, Belmont, Bath.
Bloomfield, Rev. E. N., M.A., Guestling, near Hastings.
Boston Public Library, U.S., Boston.
Boswell, Dr. J. T., Balmuto, Kirkcaldy, N.B.
Brady, H. B., Esq., F.L.S., Hillfield, Gateshead.
Braikenridge, Miss, Claremont, Clevedon, Bristol.
Braithwaite, Dr. R., F.L.S., The Ferns, Clapham rise, S.W.
Brevoort, Dr. J. Carson, New York.
Brighton and Sussex Natural History Society, Brighton.
Bristol Microscopical Society, Bristol.
Brockholes, Mrs. J. Fitzherbert, Clifton hill, Garstang, Lancashire.
Brodrick, W., Esq., Little hill, Chudleigh, South Devon.
Brook-Ter., Geo., Esq., Fernbrook, Huddersfield.
Broome, C. E., Esq., M.A., F.L.S., Elmshurst, Batheaston, Bath.
Browell, E. M., Esq., Buckingham Palace, S.W.
Browne, Dr. Henry, Woodheys, Heaton Mersey, Manchester.
Browne, Rev. T. H., F.G.S., The Cedars, High Wycombe, Bucks.
Buckton, G. B., Esq., F.R.S., Weycombe, Haslemere, Surrey.
Burn, Dr. W. B., Ecclesbourne, Bedford hill road, Balham, S.W.
Burton, John, Esq., Lee terrace, Blackheath, S.E.
Bury District Co-operative Provision Society (Limited), Marke street, Bury, Lancashire.
Busk, Professor George, F.R.S., F.L.S., 32, Harley street, Cavendish square, W.
Byerley, I., Esq., F.L.S., *Local Secretary*, Seacombe, Cheshire.

Cambridge University Library.
Cambridge University Museum of Zoology.
Cambridge, Downing College.
Cambridge, Gonville and Caius College.
Cambridge, St. Catharine's College.
Cambridge, Sidney-Sussex College.
Cambridge, Trinity College.
Campbell, F. M., Esq., Rose hill, Hoddesdon.
Carpenter, Dr. A., High street, Croydon, S.
Carpenter, Dr. W. B., F.R.S., 56, Regent's park road, N.W
Cartwright, Rev. A. R., Havyatt Lodge, Langford, Bristol.
Carus, Dr. Victor, Leipsic.
Cash, W., Esq., Elmfield terrace, Savile park, Halifax.
Chapman, E., Esq., Frewen Hall, Oxford.
Cheltenham Permanent Library, Cheltenham.
Chicago Library, Chicago.
Christiania, University of.
Church, Dr. W. S., 130, Harley Street, W.
Clark, J. A., Esq., 11, Duncan place, London fields, Hackney, E.
Cleland, Professor, 2, The College, Glasgow.
Clermont, Lord, Ravensdale park, Newry, Ireland.
Clunckauch, M. K., Esq., Paris.
Collings, Rev. W. T., M.A., F.L.S., Hirzel House, Guernsey.
Colman, Jeremiah J., Esq., M.P., Carrow House, Norwich.
Cooke, Benjamin, Esq., 103, Windsor Road, Southport.
Cooper, Colonel E. H., 42, Portman square, W.
Cooper, Sir Daniel, Bart., 6, De Vere gardens, Kensington Palace, W.
Coppin, John, Esq., Kingfield House, by Corbridge-on-Tyne, R.S.O.
Cork, Queen's College, Cork.
Cornwall, Royal Institution of, Truro.
Craven, Alfred E., Esq., 65, St. George's road, S.W.
Cresswell, Rev. R., Teignmouth, Devon.
Croft, R. Benyon, Esq., R.N., F.L.S.,, Farnham Hall, Ware, Herts.
Crowley, Philip, Esq., Wadden House, Croydon, S.
Cruickshank, Alexander, Esq., 12, Rose street, Aberdeen.
Cunningham, Professor R. O., *Local Secretary*, Queen's College, Belfast.

Darwin, F., Esq., Down, Kent.
Dawson, Professor J. W., F.R.S., F.G.S., M'Gill College, Montreal.

Deane, Jas., Esq., F.L.S., 17, The Pavement, Clapham, S.W.
Devon and Exeter Institution, Exeter.
Devonshire, Duke of, F.R.S., 78, Piccadilly, W.
Dickinson, Wm., Esq., 3, Whitehall place, S.W.
Dickson, Professor Alexander, 11, Royal circus, Edinburgh.
Dohrn, Dr. Anton, Naples.
Douglas, J. W., Esq., Long Room, Custom House, E.C.
Douglas, Rev. R. C., Manaton Rectory, Moreton Hampstead, Exeter.
Douglas, W. D. R., Esq., Orchardton, Castle Douglas, N.B.
Drewitt, D. O., Esq., Jarrow Hall, Newcastle-on-Tyne.
Drosier, Dr. W. H., Cambridge.
Dublin, National Library.
Dublin, Royal Irish Academy.
Dublin, Royal College of Surgeons.
Dublin, Trinity College.
Dublin, Hon. Society of King's Inn.
Ducie, Earl of, F.R.S., F.G.S., 16, Portman square, W.
Dunning, J. W., Esq., M.A., F.L.S., 12, Old square, Lincoln's Inn, W.C.

East Kent Natural History Society, Canterbury.
Edgeworth, M. P., Esq., F.L.S., 6, Notham gardens, Oxford.
Edinburgh College of Physicians.
Edinburgh, Library of University of.
Edinburgh Museum of Science and Art.
Edinburgh, Royal Society of.
Edinburgh Royal Physical Society, 40, Castle street, Edinburgh.
Elliot, Sir W., F.L.S., Hawick, Roxburghshire.
Elphinstone, H. W., Esq., F.L.S., 2, Stone Buildings, Lincoln's Inn, W.C.
England, Royal College of Surgeons of, Lincoln's-inn-fields, W.C.
England, Bank of, Library, London, E.C.
Enniskillen, the Earl of, D.C.L., F.R.S., F.G.S., 65, Eaton place, S.W.
Ethering, Dr. von, Leipzig.

Ferguson, W., Esq., F.L.S., F.G.S., Kinmundy House, near Mintlaw, Aberdeenshire.
Ffarington, Miss M. H., Worden Hall, near Preston.

Fitch, Fred., Esq., F.R.G.S., Hadleigh House, Highbury New Park, N.
Flower, J., Esq., M.A., F.Z.S., Fairfield road, Croydon, S.
Flower, W. H., Esq., F.R.S., Royal College of Surgeons, W.C.
Foran, J. C., Esq., Marshfield House, Terminus road, Eastbourne.
Ford, J., Esq., The Uplands, Tettenhall, Wolverhampton.
Foster, C., Esq., Thorpe, Norwich.
Fowler, Rev. W. W., Repton.
Friedlander & Son, Messrs., Berlin.
Fuller, Rev. A., Pallant, near Chichester.

Galton, Capt. Douglas, F.R.S., F.L.S., 12, Chester street, Grosvenor place, S.W.
Gatty, C. H., Esq., F.L.S., F.G.S., Felbridge Park, East Grinstead, Sussex.
Geological Society, London, W.
Geological Survey of India, Calcutta.
George, Frederick, Esq., 10, Finchley road, St. John's wood, N.W.
Gerold and Sons, Messrs., Vienna.
Gibson, G. S., Esq., F.L.S., Saffron Walden, Essex.
Glasgow Philosophical Society, Glasgow.
Glasgow University, Glasgow.
Godman, F. D., Esq., F.L.S., 10, Chandos street, Cavendish square, W.
Goode, J. F., Esq., 3, Regent place, Birmingham.
Gordon, Rev. George, LL.D., Manse of Birnie, by Elgin, N.B.
Gottingen, University of, Gottingen.
Graham, W., Esq., F.R.M.S., Ludgate hill, Birmingham.
Green, R. Y., Esq., Newcastle-on-Tyne.
Grieve, Dr. J., care of W. L. Buchanan Esq., St. Vincent street, Glasgow.
Grut, Ferdinand, Esq., 9, King street, Southwark, S.E.
Günther, Dr., F.R.S., British Museum, W.C.

Hackney Microscopical and Natural History Society, per A. J. Clark, Esq., Treasurer, 48, Broadway, London fields, Hackney, E.
Haeckel, Professor, Jena, Prussia.
Hailstone, Edward, Esq., F.S.A., Walton Hall, Wakefield.

Haines, J. P. Wilton, Esq., King street, Gloucester.
Hamilton, Dr. E., F.L.S., F.G.S., 9, Portugal street, Grosvenor square, W.
Hancock, John, Esq., Newcastle-on-Tyne.
Harford, F., Esq., Ocean Marine Insurance Company, 2, Old Broad street, E.C.
Harmer, Sidney F., Esq., B.Sc., King's College, Cambridge.
Harper, P. H., Esq., 30, Cambridge street, Hyde Park, W.
Harris, Edw., Esq., F.G.S., Rydal Villa, Longton Grove, Upper Sydenham.
Harris, Dr. F., F.L.S., 24, Cavendish square, W.
Harvey, Dr. J. R., 7, Upper Merrion street, Dublin.
Harvard College, Cambridge, U.S.
Hawkins, Dr. B. L., Woburn, Beds.
Hayek, Herr Gustav Edler von, Vienna.
Hepburn, Sir T. B., Bart., Smeaton, Preston Kirk, N.B.
Hertfordshire Natural History Society and Field Club, Watford.
Hicks, Dr. John B., F.R.S., 24, George street, Hanover square, W.
Hicks, Dr. J. Sibley, 2, Erskine Street, Liverpool.
Hillier, J. T., Esq., 4, Chapel place, Ramsgate.
Hilton, James, Esq., 60, Montagu square, W.
Hoest, Dr., Copenhagen.
Holdsworth, E. W. H., Esq., F.L.S., 84, Clifton hill, Abbey road, N.W.
Hooker, Sir J., C.B., M.D., F.R.S., Kew, W.
Hope, A. J. B., Esq., M.P., 1, Connaught place, W.
Hopkinson, John, Esq., F.L.S., F.G.S., Wansford House, Watford.
Houghton, Rev. W., F.L.S., Preston Rectory, Wellington, Salop.
Hovenden, F., Esq., Glenlea, Thurlow Park, Dulwich, S.E.
Howden, Dr. J. C., Sunnyside, Montrose.
Huddersfield Literary and Scientific Society.
Huddersfield Naturalists' Society.
Hudson, R., Esq., F.R.S., F.G.S., Clapham common, S.W.
Hughes, W. R., Esq., F.L.S., *Local Secretary*, Wood House, Handsworth, Birmingham.
Hull Subscription Library.
Humphry, Professor, F.R.S., Cambridge.
Hunt, John, Esq., Milton of Campsie, Glasgow.
Hutchinson, R., Esq., 29, Chester street, Edinburgh.
Huxley, Professor T. H., F.R.S., Museum Practical Geology, Jermyn street, S.W.

Indian Museum, Calcutta.

Jenner, Charles, Esq., Easter Duddingsten Lodge, Portobello, Edinburgh.
Jordon, Dr. R. C. R., 35, Harborne road, Edgbaston, Birmingham.

Kenderdine, F., Esq., Morningside, Old Trafford, Manchester.
Kilmarnock Library, Kilmarnock.
Kitson, J., Esq., Elmete Hall, Leeds.

Lancaster Amicable Book Society, Lancaster.
Lawson, Professor, F.L.S., *Local Secretary,* The Botanic Gardens, Oxford.
Lee, Henry, Esq., F.L.S., F.G.S., 43, Holland street, Blackfriars road, S.E.; and Ethelbert House, Margate.
Leeds Philosopical and Literary Society, Leeds.
Leicester, Alfred, Esq., 13, Adelaide terrace, Waterloo, near Liverpool.
Leicester Free Library, Town Hall, Leicester.
Leipzig, University of, Leipzig.
Lendy, Major A. F., F.L.S., F.G.S., Sunbury House, Sunbury.
Lindsay, Charles, Esq., Ridge Park, Lanark, N.B.
Linnean Society, Burlington House, Piccadilly, W.
Lister, Arthur, Esq., F.L.S., Leytonstone.
Liverpool Athenæum, Liverpool.
Liverpool Royal Institution, Liverpool.
Liverpool Library, Lyceum, Liverpool.
Liverpool Medical Institution, Liverpool.
Liverpool Microscopical Society.
Liverpool Free Library, Liverpool.
Lobley, J. Logan, Esq., F.G.S., New Athenæum Club, Pall Mall, S.W.
London Institution, Finsbury circus, E.C.
London Library, 12, St. James's square, S.W.
Lovén, Professor, Stockholm.
Lubbock, Sir J., Bart., M.P., F.L.S., R.S., 15, Lombard street, E.C.

McGill, H. J., Esq., Aldenham Grammar School, Elstree, Herts.
McIntosh, W. C., M.D., F.L.S., Perth County Asylum, Murthly, N.B.
M'Lachlan, R., Esq., F.R.S., 39, Limes grove, Lewisham, S.E.
Maclagan, Professor Douglas, M.D., F.R.S.E., 28, Heriot row, Edinburgh.
Madras Government Museum, Madras.
Major, Charles, Esq., Red Lion Wharf, 69, Upper Thames street, E.C.
Manchester Free Public Library, Manchester.
Manchester Literary and Philosophical Society, Manchester.
Manners, Geo., Esq., F.L.S., F.S.A., Dingwall road, Croydon.
Mansell-Pleydall, J., Esq., Whatcombe, Blandford.
Martin, G. M., Esq., Southbank, Compton, Wolverhampton.
Mason, P. B., Esq., Burton-on-Trent.
Mathews, W., Esq., M.A., F.G.S., 15, Waterloo street, Birmingham.
Medlycott, W. C., Esq., Ven House, Sherborne, Dorsetshire.
Meiklejohn, Dr. J. W. S., Royal Victoria yard, Deptford, S.E.
Mennell, H. T., Esq., F.L.S., 10, St. Dunstan's buildings, Idol lane, E.C.
Microscopical Society, Royal, King's College, Strand, London.
Millar, Dr. John, F.L.S., F.G.S., Bethnall House, Cambridge road, N.E.
Millett, F. W., Esq., 13, Milner square, Islington.
Mitchell Library, the, Glasgow.
Mivart, Prof. St. George J., F.R.S., 71, Seymour street, Hyde park, W.
Morris, J. W., Esq., F.L.S., Belmont, Bath.
Moseley, Sir T., Rolleston Hall, Burton-on-Trent.
Munich Royal Library, Munich.
Murray, J., Esq., 3, Clarendon crescent, Edinburgh.
Museum of Economic Geology, London, S.W.

Natal Microscopical Society.
Naylor, John, Esq., Bank, King street, Liverpool.
Naylor, M. E., Esq., Wakefield.
Newcastle Literary and Philosophical Society, Newcastle.
Newman, J. P., Esq., 54, Hatton garden, E.C.
Noble, Capt. Jesmond, Dene House, Newcastle-on-Tyne.
Noble, Wilson, Esq., Queensbury place, S.W.
Norfolk and Norwich Literary Institution, Norwich.
Norman, Rev. A. Merle, M.A., F.L.S., Burnmoor Rectory, Fencehouses, Durham.

Nottingham Free Library.
Nottingham High School.
Nottingham Literary and Philosophical Society, Nottingham.

Owens College, Manchester.
Oxford Magdalen College.

Paisley Philosophical Society, Paisley.
Parke, Geo. H., Esq., Infield Lodge, Barrow-in-Furness.
Parker, W. K., Esq., F.R.S., 36, Claverton street, S.W.
Pascoe, F. P., Esq., F.L.S., 1, Burlington road, Westbourne Park, W.
Peck, R. Holman, Esq., B.A., F.L.S., Elmfield, Penge lane, S.E.
Peckover, Algernon, Esq., F.L.S., Wisbeach.
Peel Park Library, Salford, Lancashire.
Penny, Rev. C. W., Wellington College, Wokingham.
Penzance Public Library, Penzance.
Perthshire Society of Natural Science, per J. Coates, Esq., Pitcullen House, Perth.
Phené, J. S., Esq., LL.D., F.S.A., 5, Carlton terrace, Oakley street, S.W.
Philadelphia Academy of Natural Sciences, Philadelphia.
Plymouth Institution, Athenæum, Plymouth.
Power, H., Esq., 37A, Great Cumberland place, Hyde Park, W.
Preston Free Public Library.
Pumphrey, C., Esq., Southfield, King's Norton, near Birmingham.
Pye-Smith, Dr. P. H., 54, Harley street, Cavendish square.

Quekett Club, University College.

Radcliffe Library, Oxford.
Ramsay, Sir Andrew C., F.R.S., Museum of Economic Geology, S.W.
Rashleigh, J., Esq., 3, Cumberland terrace, Regent's park, N.W.
Reader, Thomas, Esq., 39, Paternoster row, E.C.
Reading Microscopical Society, 110, Oxford street, Reading.
Rigby, Samuel, Esq., Bruche Hall, near Warrington.
Ripon, Marquis of, F.R.S., F.L.S., 1, Carlton gardens, S.W.
Robinson, Isaac, Esq., The Wash, Hertford.

Roper, F. C. S., Esq., F.L.S., F.G.S., Palgrave House, Eastbourne.
Rothery, H. C., Esq., M.A., F.L.S,, 94, Gloucester terrace, Hyde Park, W.
Royal Institution, Albemarle street, W.
Royal Medical and Chirurgical Society, 53, Berners street, W.
Royal Society, Burlington House, London, W.
Rowe, J. B., Esq., Mulgrove, Plymouth.
Rylands, T. G., Esq., F.L.S., *Local Secretary*, High Fields, Thelwall, near Warrington.

Salter, Dr. S. J. A., F.R.S., *Treasurer*, Basingfield, near Basingstoke, Hants.
Salvin, Osbert, Esq., F.L.S., 10, Chandos street, Cavendish square.
Samson and Wallin, Messrs., London.
Sanders, Alfred, Esq., F.L.S., Milton, Sittingbourne, Kent.
Sanford, W. A., Esq., F.G.S., Nynehead Court, near Wellington, Somersetshire.
Scientific Club, 7, Savile row, W.
Sclater, P. L., Esq., M.A., Ph.D., F.L.S., R.S., 11, Hanover square, W.
Scott, Dr. Wm., Lissenderry, Aughuacloy, Ireland.
Sharp, I., Esq., F.G.S., Culverden hill, Tunbridge Wells.
Sharpus, F. W., Esq., 30, Compton road, Islington, N.
Sheffield Literary and Philosophical Society, Sheffield.
Sion College Library, London Wall, E.C.
Slack, H. I., Esq., F.G.S., Ashdown Cottage, Forest row, Sussex.
Sladen, Rev. E. H. M., The Gore, Bournemouth.
Slatter, Rev. John, The Vicarage, Streatley, Reading.
Slatter, T. J., Esq., F.G.S., Evesham.
Sloper, G. E., Esq., Devizes.
Smart, Robert B., Esq., 176, Waterloo place, Oxford road, Manchester.
Smith, Basil Woodd, Esq., F.R.A.S., Branch hill, Hampstead, N.W.
Smith, Capt. R., Frankfort Avenue, Rathgar, Dublin.
Somersetshire Archæological and Natural History Society, Taunton.
Sotheran, Messrs., 136, Strand, W.C.
South London Microscopical Club.
Southport Free Library.
Spicer, Messrs., Brothers, 19, New Bridge street, Blackfriars, E.C.
St. Andrew's University Library, St. Andrew's.
Stainton, H. T., Esq., F.R.S., L.S., Mountsfield, Lewisham, S.E.
Stebbing, Rev. T. R. R., Warberry House, Bishopsdown Park, Tunbridge Wells.

Steele, Dr. W. E., *Local Secretary*, 15, Hatch street, Dublin.
Stephenson, J. W., Esq., Equitable Assurance Office, Mansion-house street, E.C.
Stewart, C., Esq., F.L.S., St. Thomas's Hospital, Newington, S.W.
Stockholm Royal Academy, Stockholm.
Stowell, Rev. H. A., Breadsall Rectory, near Derby.
Strasbourgh University Library.
Stroud Natural History and Philosophical Society, Stroud.
Stubbins, J. Esq., Chester College, Old lane, Halifax.
Sunderland Subscription Library, Sunderland.
Swain, E., Esq., 34, Elsham road, Addison road, Kensington, N.
Swanston, W., Esq., F.G.S., 50, King street, Belfast.

Toronto, University of, Canada.
Torquay Natural History Society, Torquay.
Townsend, F., Esq., M.A., Honington Hall, Shipston-on-Stour.
Trail, Prof. W. H., M.B., *Local Secretary*, King's College, Old Aberdeen.
Tristram, Rev. Canon H. B., LL.D., F.R.S., The College, Durham.
Trubner & Co., Messrs., London.
Turner, Professor W., F.R.S.E., Anatomical Museum, University of Edinburgh.
Tyler, Captain Charles, F.L.S., F.G.S., 317, Holloway road, Holloway, N.

University College, London.
Upsala, University of, Sweden.

Vass, M., Leipzig.
Vicars, John, Esq., sen., Seel street, Liverpool.
Vicary, William, Esq., The Priory, Colleton crescent, Exeter.
Vinen, Dr. E. Hart, F.L.S., 17, Chepstow villas West, Bayswater, W.

Wakefield Mechanics' Institution, Wakefield.
Walker, Alfred O., Esq., Chester.
Warden, Dr. Charles, 272, Hagley road, Edgbaston, Birmingham.

Warrington Museum and Library, Warrington.
Warwickshire Natural History Society, Warwick.
Washington Library of Congress, U.S.
Watkinson Library, Harford, Con., U.S.A.
Webster, Rev. W. H., Westfield, Battle, Sussex.
Weir, J. J., Esq., 6, Haddo villas, Blackheath, S.E.
Wells, J. R., Esq., 20, Fitzroy street, Fitzroy square, W.C.
West Kent Natural History Society, Lewisham, S.E.
White, A., Esq., F.L.S., West Drayton.
White, Dr. F. B., F.L.S., 2, Athol place, Perth.
Wills, A. W., Esq., F.C.S., Wylde Green, Erdington, Birmingham.
Wilson, Dr. E., Westal, Cheltenham.
Wiltshire, Rev. Professor T., M.A., F.L.S., G.S., *Secretary*, 25, Granville park, Lewisham, London, S.E.
Wollaston, G. H., Esq., 4, College road, Clifton, near Bristol.
Woodd, B. T., Esq., Conyngham Hall, Knaresborough, Yorkshire.
Wright, Professor E. P., F.L.S., Trinity College, Dublin.

Yale College, New Haven, U.S.
Yeoman, T. P., Esq., 4, St. Hildas terrace, Whitby.
York Philosophical Society, York.

Zoological Society, 11, Hanover square, W.

LIST OF THE ANNUAL VOLUMES

OF THE

RAY SOCIETY.

FROM THEIR COMMENCEMENT, IN 1844, TO
AUGUST, 1882.

LIST OF THE ANNUAL VOLUMES ISSUED BY THE RAY SOCIETY.

For the First Year, 1844.

I. Reports on the Progress of Zoology and Botany. Translated by H. E. Strickland, Jun., M.A., F.R.S., E. Lankester, M.D., F.R.S., and W. B. Macdonald, B.A. 8vo.

II. Memorials of John Ray: consisting of the Life of John Ray, by Derham; the Biographical Notice of Ray, by Baron Cuvier and M. Dupetit Thouars, in the 'Biographie Universelle;' Life of Ray, by Sir J. E. Smith: the Itineraries of Ray, with Notes, by Messrs. Babington and Yarrell. Edited by E. Lankester, M.D., F.R.S. 8vo.

III. A Monograph of the British Nudibranchiate Mollusca. By Messrs. Alder and Hancock. Part I. Ten Plates. Imp. 4to.

For the Second Year, 1845.

I. Steenstrup on the Alternation of Generations. Translated from the German, by George Busk, F.R.S. Three Plates. 8vo.

II. A Monograph of the British Nudibranchiate Mollusca. By Messrs. Alder and Hancock. Part II. Thirteen Plates. Imp. 4to.

III. Reports and Papers on Botany, consisting of Translations from the German. Translated by W. B. Macdonald, B.A.; G. Busk, F.R.S.; A. Henfrey, F.R.S.; and J. Hudson, B.M. Seven Plates. 8vo.

For the Third Year, 1846.

I. Meyen's Geography of Plants. Translated from the German by Miss Margaret Johnston. 8vo.

II. Burmeister on the Organization of Trilobites. Translated from the German, and edited by Professors T. Bell and E. Forbes. Six Plates. Imp. 4to.

III. A Monograph of the British Nudibranchiate Mollusca. By Messrs. Alder and Hancock. Part III. Eleven Plates. Imp. 4to.

For the Fourth Year, 1847.

I. Oken's Elements of Physio-philosophy. Translated from the German by Alfred Tulk. 8vo.

II. Reports on the Progress of Zoology. Translated from the German by Messrs. Geo. Busk, A. H. Haliday, and A. Tulk. 8vo.

III. A Synopsis of the British Naked-eyed Pulmograde Medusæ. By Professor E. Forbes, F.R.S. Thirteen Plates. Imp. 4to.

For the Fifth Year, 1848.

I. Bibliographia Zoologiæ et Geologiæ. By Professor Agassiz. Vol. I. 8vo.

II. Letters of John Ray. Edited by E. Lankester, M.D., F.R.S. Two Plates. 8vo.

III. A Monograph of the British Nudibranchiate Mollusca. By Messrs. Alder and Hancock. Part IV. Twelve Plates. Imp. 4to.

For the Sixth Year, 1849.

I. Reports and Papers on Vegetable Physiology and Botanical Geography. Edited by A. Henfrey, F.R.S. Three Plates. 8vo.

II. A Monograph of the British Entomostracous Crustacea. By W. Baird, M.D., F.R.S. Thirty-six Plates. 8vo.

For the Seventh Year, 1850.

I. Bibliographia Zoologiæ et Geologiæ. By Professor Agassiz. Vol. II. 8vo.

II. A Monograph of the British Nudibranchiate Mollusca. By Messrs. Alder and Hancock. Part V. Fifteen Plates. Imp. 4to.

For the Eighth Year, 1851.

I. A Monograph of the British Angiocarpous Lichens. By the Rev. W. A Leighton, M.A. Thirty Plates. 8vo.

II. A Monograph of the Family Cirripedia. By C. Darwin, M.A., F.R.S. Vol. I. Ten Plates. 8vo.

FOR THE NINTH YEAR, 1852.

I. Bibliographia Zoologiæ et Geologiæ. By Professor Agassiz. Vol. III. 8vo.

II. A Monograph of the British Nudibranchiate Mollusca. By Messrs. Alder and Hancock. Part VI. Twelve Plates. Imp. 4to.

FOR THE TENTH YEAR, 1853.

I. A Monograph of the Family Cirripedia. By C. Darwin, M.A., F.R.S. Vol. II. Thirty Plates. 8vo.

II. A Volume of Botanical and Physiological Memoirs, including Braun on Rejuvenescence in Nature. Six Plates. 8vo.

FOR THE ELEVENTH YEAR, 1854.

Bibliographia Zoologiæ et Geologiæ. By Professor Agassiz. Vol. IV. 8vo. (Completing the work.)

FOR THE TWELFTH YEAR, 1855.

A Monograph of the British Nudibranchiate Mollusca. By Messrs. Alder and Hancock. Part VII. Nine Plates. Imp. 4to. (Completing the work.)

FOR THE THIRTEENTH YEAR, 1856.

A Monograph of the British Fresh-water Polyzoa. By Professor Allman, F.R.S. Eleven Plates. Imp. 4to.

FOR THE FOURTEENTH YEAR, 1857.

A Monograph of the Recent Foraminifera of Great Britain. By Professor Williamson, F.R.S. Seven Plates. Imp. 4to.

FOR THE FIFTEENTH YEAR, 1858.

The Oceanic Hydrozoa. By Professor Huxley, F.R.S. Twelve Plates. Imp. 4to.

FOR THE SIXTEENTH YEAR, 1859.

A History of the Spiders of Great Britain and Ireland. By John Blackwall, F.L.S. Part I. Twelve Plates. Imp. 4to.

FOR THE SEVENTEENTH YEAR, 1860.

An Introduction to the Study of the Foraminifera. By W. B. Carpenter, M.D., F.R.S., F.L.S., &c., assisted by W. K. Parker, F.R.S., and T. Rupert Jones, F.G.S. Twenty-two Plates. Imp. 4to.

FOR THE EIGHTEENTH YEAR, 1861.

On the Germination, Development, and Fructification of the Higher Cryptogamia, and on the Fructification of the Coniferæ. By Dr. Wilhelm Hofmeister. Translated by Frederick Currey, M.A., F.R.S., Sec. L.S. Sixty-five Plates. 8vo.

For the Nineteenth Year, 1862.

A History of the Spiders of Great Britain and Ireland. By John Blackwall, F.L.S. Part II. Seventeen Plates. Imp. 4to. (Completing the work.)

For the Twentieth Year, 1863.

The Reptiles of British India. By Albert C. L. G. Günther, M.D., F.R.S. Twenty-six Plates. Imp. 4to.

For the Twenty-first Year, 1864.

A Monograph of the British Spongiadæ. By J. S. Bowerbank, LL.D., F.R.S. Vol. I. Thirty-seven Plates. 8vo.

For the Twenty-second Year, 1865.

I. The British Hemiptera Heteroptera. By Messrs. J. W. Douglas and John Scott. Twenty-one Plates. 8vo.

II. A Monograph of the British Spongiadæ. By J. S. Bowerbank, LL.D., F.R.S. Vol. II. 8vo.

For the Twenty-third Year, 1866.

I. The Miscellaneous Botanical Works of Robert Brown, D.C.L., F.R.S. Vol. I, containing Geographico-botanical, and Structural, and Physiological Memoirs. Edited by J. J. Bennett, F.R.S. 8vo.

II. Recent Memoirs on the Cetacea. By Professors Eschricht, Reinhardt, and Lilljeborg. Edited by W. H. Flower, F.R.S. Six Plates. Imp. 4to.

III. Nitzch's Pterylography, translated from the German. Edited by P. L. Sclater, F.R.S. Ten Plates. Imp. 4to.

For the Twenty-fourth Year, 1867.

I. A Monograph on the Structure and Development of the Shoulder-girdle. By W. K. Parker, F.R.S. Thirty Plates. Imp. 4to.

II. The Miscellaneous Botanical Works of Robert Brown, D.C.L., F.R.S. Vol. II. 8vo.

For the Twenty-fifth Year, 1868.

I. Vegetable Teratology. By M. T. Masters, M.D., F.L.S. 8vo.

II. The Miscellaneous Botanical Works of Robert Brown, D.C.L., F.R.S. Vol. III. Thirty-eight Plates. Imp. 4to. (Completing the work.)

For the Twenty-sixth Year, 1869.

A Monograph of the Gymnoblastic or Tubularian Hydroids. By J. Allman, M.D., F.R.S. Part I. Twelve Plates. Imp. 4to.

For the Twenty-seventh Year, 1870.

A Monograph of the Gymnoblastic or Tubularian Hydroids. By J. Allman, M.D., F.R.S. Part II. Eleven Plates. Imp. 4to. (Completing the work.)

For the Twenty-eighth Year, 1871.

A Monograph of the Collembola and Thysanura. By Sir J. Lubbock, Bart., M.P., F.R.S. Seventy-eight Plates. 8vo.

For the Twenty-ninth Year, 1872.

A Monograph of the British Annelids. By W. C. M'cIntosh, M.D., F.R.S.E. Part I. Ten Plates. Imp. 4to.

For the Thirtieth Year, 1873.

A Monograph of the British Annelids. By W. C. M'cIntosh, M.D., F.R.S.E. Part I. continued. Thirteen Plates. Imp. 4to.

For the Thirty-first Year, 1874.

A Monograph of the British Spongiadæ. By J. S. Bowerbank, LL.D., F.R.S. Vol. III. Ninety-two Plates. 8vo.

For the Thirty-second Year, 1875.

A Monograph of the British Aphides. By G. B. Buckton, F.R.S. Vol. I. Forty-two Plates. 8vo.

For the Thirty-third Year, 1876.

A Monograph of the British Copepoda. By G. S. Brady, M.D., F.L.S. Vol. I. Thirty-six Plates. 8vo.

FOR THE THIRTY-FOURTH YEAR, 1877.

A Monograph of the British Aphides. By G. B. Buckton, F.R.S. Vol. II. Fifty Plates. 8vo.

FOR THE THIRTY-FIFTH YEAR, 1878.

A Monograph of the British Copepoda. By G. S. Brady, M.D., F.L.S. Vol. II. Forty-nine Plates. 8vo.

FOR THE THIRTY-SIXTH YEAR, 1879.

I. A Monograph of the British Copepoda. By G. S. Brady, M.D., F.L.S. Vol. III. Eleven Plates. 8vo. (Completing the work.)

II. A Monograph of the British Spongiadæ. By the late J. S. Bowerbank, LL.D., F.R.S. Edited, with additions, by Rev. A. M. Norman, M.A., F.L.S. Vol. IV. Seventeen Plates. 8vo. (Completing the work.)

FOR THE THIRTY-SEVENTH YEAR, 1880.

A Monograph of the British Aphides. By G. B. Buckton, F.R.S. Vol. III. Twenty-eight Plates. 8vo.

FOR THE THIRTY-EIGHTH YEAR, 1881.

A Monograph of the British Phytophagous Hymenoptera. By P. Cameron. Vol. I. Twenty-one Plates. 8vo.

PRINTED BY J. E. ADLARD, BARTHOLOMEW CLOSE.

no